The Great Recession and the Widening Income Gap Between Alumni of Elite and Less Selective Universities*

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Abstract

Using mobility report card data, I show the income gap between alumni of elite and less selective universities widened for cohorts graduating during the Great Recession. This gap widens for students with top-income-quintile parents, and less systematically for lower-income students. Potential explanations include: ability increases resilience, and selective universities causally enable resilience. Using a unique dataset of recruiting strategies for 65 prestigious firms, I highlight one channel through which university selectivity may have a causal impact: high-wage firms concentrated their recruiting at elite universities during the recession. The results are informative for policies increasing lower-income students' representation at selective universities.

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1 Introduction

What is the role of universities in enabling income mobility and income success? Lower-income students are more concentrated at less selective universities, and graduates of these universities have substantially lower incomes (Chetty et al., 2020). As a result, there has been considerable interest in policies that increase representation of middle- and lower-income students at selective universities.[1][2] In this paper I consider a benefit of graduating from a selective university that has received limited attention, and that has implications for these policies: selective universities increase graduates' resilience to negative economic shocks.

This paper has three main objectives. First, I show the income gap between alumni of elite and less selective universities widened for cohorts graduating during the Great Recession. Second, I show whether this gap widens among students from lower- and middle-income families. This is relevant for policies that increase access to selective universities, and their potential effects on income mobility.

There are a variety of explanations for the widening income gap by university selectivity among recession cohorts. One broad class of explanations is that elite universities enable resilience to negative labor market shocks, and another is that students at elite universities have individual characteristics making them more resilient, including ability. There is still limited evidence on the channels through which elite universities causally affect labor market outcomes. In the last part of the paper, I highlight one channel through which university selectivity may have a causal effect on resilience to negative shocks: during recessions prestigious firms concentrate their recruiting at elite universities.

First, using a triple-difference specification, I show the income gap between graduates of elite and less selective universities widened for graduates during the Great Recession,

[1] See Hoxby and Avery (2013) for a description of university policies to increase lower-income students' enrollment. Chetty et al. (2020) consider the impacts of students enrolling in college in an income-neutral manner conditional on test scores. Machado, Reyes and Riehl (2022) show that increasing student body diversity (including by parental income) results in worse labor market outcomes for highly-ranked students.

[2] The paper also relates to several papers studying who has access to high-wage jobs at labor market entry (Zimmerman, 2019; MacLeod et al., 2017; Weinstein, 2018, 2022), as well as a large literature on the value of graduating from an elite university.

comparing universities in the same commuting zone (CZ) and using mobility report card income data in 2014 (Chetty et al., 2020). There is a widening gap in median incomes, as well as likelihood of earning in the highest percentiles of the income distribution. To my knowledge, this is the first paper to establish this fact for U.S. students. I identify this effect, separately from persistent lifecycle differences across university selectivity tiers, by comparing universities in severely-affected areas to universities in mildly-affected areas. I also control for differential changes in students' parental incomes at universities in severely-affected areas.

The gap in median earnings between Barron's Tier 1 and same-CZ Tier 3-5 universities expands an additional 10% in severely- versus mildly-affected CZs for the 1987 (recession) birth cohort, relative to the 1983 (pre-recession) cohort. This is roughly one half of the gap for the 1987 cohort in mildly-affected CZs. These effects are among graduates roughly five years after their graduation, suggesting the effects persist during the early part of an individual's career.

There is also a widening gap in the likelihood of earning in the top income quintile for the birth cohort. Strikingly, more than half of this appears explained by the likelihood of top 5% earnings. The gap between Tier 1 and Tier 3-5 universities in the likelihood of top 5% earnings for the birth cohort increased an additional 3.7 percentage points for the 1987 birth cohort in severely- versus mildly-affected CZs, roughly 30% of the gap in mildly-affected CZs.

Second, I show these widening gaps by university selectivity, for students whose parents are in the top parental income quintile. While less systematic and less precise, there is also suggestive evidence that the gap widens for students from lower- and middle-income families.

The results do not appear fully explained by parental income differences. I consider several other explanations, and show the results are not driven by these either, including differences across tier in college majors, labor force participation, and changing composition of SAT scores among students.

There are two important classes of explanations that are difficult to test with these data, but may explain the results: ability differences and causal university effects.[3] Ability measures may differ by university selectivity. I compare outcomes of very elite and less selective university alumni in severely-affected CZs, and compare those to the difference in mildly-affected CZs. Thus, the triple difference ensures the results are not driven by differences in income by university selectivity tier, because of differences in income by ability. However, ability differences may have a greater impact on incomes in severely-affected areas relative to mildly-affected areas, for example through employer learning or occupations, and the triple difference does not separately identify this channel. This set of explanations would not imply a causal role for universities.

To the extent that the results reflect ability differences across selectivity tier, they highlight that graduates of less selective universities are most at risk of adverse impacts during recessions and in potential need of support from policymakers or their universities.

Selective universities may also have a causal effect on graduates' resilience to negative economic shocks. Chetty et al. (2020) suggest that at least 80% of the difference in earnings premia across colleges, conditional on test scores, parental income, and race, is explained by colleges' causal effects. While this paper is not able to condition on test scores or race due to data availability, the results in Chetty et al. (2020) suggest there are many lower- and middle-income high-test score students at less selective universities.

To the extent that the results partly reflect causal effects of university selectivity, this raises two open questions. First, why do affluent students appear to benefit more strongly and systematically from elite universities. While this paper does not address this question directly, it is consistent with other papers suggesting that affluent students benefit more from elite networks (Michelman, Price and Zimmerman, 2022; Rivera, 2012; Zimmerman, 2019). Of course, effects for lower-income students may be less precise because of the small numbers of these students at very elite universities.

[3]See Oreopolous, von Wachter and Heisz (2012) for a discussion of mechanisms that could explain differential effects by university selectivity.

Second, what are the channels through which elite universities might enable greater resilience to negative shocks. In the second part of the paper I focus on one potential source of universities' causal effects on graduates' resilience: high-wage firms concentrate their recruiting at elite universities during recessions.

Campus recruiting is an important way in which college students find jobs. In a recent survey of 275 firms across many industries, over 75% conducted on-campus interviews, and nearly 60% of full-time entry-level college hires were initially interviewed on campus (National Association of Colleges and Employers, 2014). Evidence shows recessions' persistent effects are importantly explained by starting one's career at a lower quality employer (Oreopolous, von Wachter and Heisz, 2012).[4] This underscores the importance of understanding changes in matching at labor market entry.

Firms may stop recruiting from less selective universities during recessions for several reasons. Recruiting at less selective universities may require more screening, and this may be unprofitable during recessions (suggested by the model in Weinstein (2018)). These higher costs also increase recruiting intensity per vacancy, and recent work shows firms decrease hires in part through decreasing recruiting intensity.[5] Further, if firms' offer acceptance rates increase at more selective universities during recessions, the need to recruit at less selective universities falls, related to an upskilling story.

Given that graduates of less selective universities lose access to the highest incomes, it seems especially possible that high-wage employers differentially stopped recruiting at these universities. I evaluate this mechanism using panel data I collected on the university campuses that employers target for recruiting from 2000-2013, focusing on a sample of 65 prestigious finance, consulting, and Fortune 250 companies recruiting for business positions.

[4]Oyer (2006) shows starting one's career at a lower-ranked university, because of the business cycle, has persistent effects for economists. Liu, Salvanes and Sorensen (2016) find the importance of match quality at one's first employer in Norway from 1986-2007, and Arellano-Bover (2020) shows the importance of starting at a larger firm, conditional on the business cycle.

[5]See Davis, Faberman and Haltiwanger (2013); Carillo-Tudela, Gartner and Kaas (2021); Forsythe and Weinstein (2021); Lochner et al. (2021); Hershbein and Kahn (2018); Modestino, Shoag and Ballance (2020). In the model of Acharya and Wee (2020) firms become more selective during recessions as there are greater losses from hiring lower quality workers.

I present several new findings consistent with this mechanism. First, students lost access to prestigious firms during the Great Recession. Second, access to high-wage firms becomes more concentrated at more selective universities during the recession. Firms were more likely to drop their less selective target campuses by 2009, and to resume recruiting at their most selective targets by 2011.

In addition to this paper's broader contribution to understanding the role of universities in income mobility, it also contributes to the literature showing both immediate and persistent effects of graduating during a recession (Altonji, Kahn and Speer, 2016; Kahn, 2010; Oreopolous, von Wachter and Heisz, 2012; Liu, Salvanes and Sorensen, 2016).[6] While this fact has been well established, there is still limited evidence showing which graduates are most affected and why.

Oreopolous, von Wachter and Heisz (2012) is an important exception showing more adverse effects of earlier recessions in Canada for graduates with lower predicted earnings, based on their college, major, and years of study.[7] In addition to presenting evidence in a different setting – graduates of U.S. universities during the Great Recession – I contribute to this literature in several ways. First, I show a widening income gap by university selectivity, even conditional on parental income quintile. I show the clearest effects are for students from the top parental income quintile, with results that are less systematic but suggestive of some effects for students from lower- and middle-income families. These findings are very relevant for policies that increase access to selective universities. While the Canadian administrative data used in Oreopolous, von Wachter and Heisz (2012) are very rich, they do not match workers and their parents. Thus, their results may reflect parental income differences across colleges and their role in resilience to recessions.

Second, my results contribute to the literature by showing striking widening gaps in access to the very top of the earnings distribution, which was not analyzed in Oreopolous,

[6]Forsythe (Forthcoming) shows high unemployment rates reduce the hiring rate of young, but not older, workers.

[7]Altonji, Kahn and Speer (2016) show less negative impacts of graduating in a recession for students in high paying majors.

von Wachter and Heisz (2012), in addition to widening gaps in average and median earnings. This helps provide greater context for the mechanisms that may be important. Finally, I show evidence for one channel through which selective universities may have a causal impact: access to prestigious firms on campus.

Further, I document how employers adjust recruiting intensity during recessions. Starting with Davis, Faberman and Haltiwanger (2013), adjustments in recruiting intensity have been suggested as one reason the standard matching function broke down during the Great Recession. However, with the exceptions noted above, there has been limited micro-level evidence. I find employers more likely stop recruiting at campuses that are less selective, smaller, farther, and have less affluent students. This is consistent with declines in recruiting intensity and effort.[8]

2 The Great Recession and Widening Income Gaps Between Elite and Less Selective University Alumni

I start by showing that the income gap between alumni of elite and less selective universities widened for birth cohorts who likely graduated during the Great Recession. I use the mobility report cards (Chetty et al., 2020), which contain 2014 income data by university and birth cohort, for 1980-1991 birth cohorts of alumni.[9] I estimate the following triple-differences model:

$$Y_{j_{ks}t} = \kappa_j + \beta_{st} + \gamma_{kt} + \lambda_{kt} Cohort_t * Tier_j * SevereRecession_{j_{ks}} + \rho_{kt} Cohort_t * Z_{jt} * SevereRecession_{j_{ks}} + X_{jt}\delta + u_{jt} \quad (1)$$

[8]Recruiting at smaller universities may require recruiting at more universities overall.

[9]These data are based on enrollees of the college, and do not restrict to graduates of the college. See Chetty et al. (2020) for details on how attendance is defined. Income is measured as total pre-tax individual earnings, including wage earnings and self-employment income.

The dependent variable is the natural log of median income in 2014 among positive earners, for graduates of university j, in birth cohort t, where university j is in selectivity tier k and location s. I also show results without restricting to positive earners. We include university fixed effects, and so we analyze within-university differences in alumni income in 2014, across birth cohorts. We analyze whether the differences across cohorts differ by university selectivity tier, by including birth cohort-selectivity tier fixed effects γ_{kt}. Including local area by cohort fixed effects β_{st}, we compare these differences across university tier among universities in the same area. For the main results, I define commuting zones as the local area.

We observe incomes of the recession cohorts in their mid- to late-20s, and of the pre-recession cohorts in their early 30s. If there are differences across university tier in the timing of income growth, comparison of recession and pre-recession cohorts may be capturing these differences rather than recession effects.[10] To account for this I include a triple difference ($Cohort * Tier * Severe$), comparing differences across birth cohorts by university selectivity tier in areas that experienced severe recessions, to those that experienced milder recessions. This triple difference identifies the additional effect of the recession on across-tier differences. Yagan (2019) uses a similar strategy, to identify the recession's longer-run employment impact separately from secular nationwide shocks.

The main identification assumption is that there were no differential changes at less selective universities timed with the recession, that were correlated with 2014 income, and stronger in severely-affected CZs. One of the main concerns is that there were differential changes in parental incomes by university selectivity, in commuting zones that would be severely-affected by the Great Recession.[11] As Chetty et al. (2017) discuss, this was a period of declining real incomes for low-income families, widening inequality, as well as some elite

[10] Chetty et al. (2020) shows differences across university selectivity tier in how quickly income percentiles stabilize.

[11] An alternative is that there is a larger income gap between elite and Tier 3-5 graduates in severely-affected areas, even absent the recession, that narrows over time. This would imply an increasing, rather than flat, pre-trend.

universities actively targeting an increase in low-income student enrollment. Chetty et al. (2017) show substantial heterogeneity in trends in low-income students' access to college over this period, across universities within selectivity tier.

This suggests the importance of controlling for changes in parental incomes over time by selectivity tier, that were different in severely-affected CZs. In equation (1), I include interactions between cohort fixed effects, an indicator for severe recession, and the following time-varying university variables Z_{jt}: fraction of students with parents in the second parental income quintile, fraction in the third, the fourth, and the fifth, and fraction with parents in the top 10% of incomes, as well as lower-level terms.[12] In X, I include the noninteracted parental income variables, as well as the log of students in the cohort, and the fraction of the cohort that is female.

I define a severely-affected CZ as one that experienced an above-median increase in the unemployment rate between 2007 and 2009, using data from Yagan (2019). University tiers k are based on the classifications in Chetty et al. (2020), which are based on the 2009 Barron's classification of universities by selectivity. Tiers include Ivy Plus (12 universities), Barron's Tier 1 (elite) universities excluding the Ivy Plus group (65 universities), Barron's Tier 2 (highly selective) universities (99 universities), Barron's Tier 3-5 (selective) universities (1003 universities), nonselective public and not-for-profit four-year universities (178 universities), and public and not-for-profit two-year colleges (778 colleges).[13]

In estimating (1), the coefficients λ are estimated relative to selective four-year universities (Tiers 3-5), and the omitted cohort is 1983. Median age at graduation was 22 for 2007-2008 graduates of top-quartile selectivity universities, 23 for lower quartiles, and 25 for open admission universities (U.S. Department of Education, National Center for Education

[12]The fraction in the first parental income quintile is the omitted category. For robustness, I also include interactions with the fraction of students whose parents are in the top 5% and in the top 1% (Table A.5). Figures A.21 through A.30 indeed show differential trends in parental income composition by selectivity tier, that are different in severely-affected areas, and timed with recession cohorts.

[13]I exclude nonselective for-profit four-year universities and for-profit two-year colleges. These may more likely involve remote instruction with students located far from the institution, and the identification relies on the institution's geography.

Statistics, 2021*a*).[14] Thus, a large fraction of the 1983 birth cohort will have graduated shortly before the recession. While many in the 1984 birth cohort also graduated before the recession, some of the students will have graduated during the recession, and moreso at the less selective universities. The coefficient $\lambda_{1987,Tier1}$ is the average additional difference between Tier 1 and same-CZ Tier 3-5 alumni in the 1987 birth cohort in severely- versus mildly-affected CZs, relative to the 1983 cohort.

Additionally, based on median age at graduation by selectivity tier, for the 1987 birth cohort the median Tier 1 graduation may have been in 2009, but 2010 for Tier 3-5. This is not a large concern, given unemployment rates were 9 to 10% for over two years (April 2009 through September 2011) and 4.5 to 5% for nearly three years before the recession (June 2005 through April 2008). Given the triple difference, it is also not a concern that Tier 1 and Tier 3-5 alumni have different potential experience at income measurement.

I show results including only universities with data for each cohort.[15] I exclude universities for which income is reported for a university system, which may include universities of multiple tiers. This yields 12 Ivy Plus universities, 59 Tier 1 universities, 73 Tier 2 universities, 611 Tier 3-5 universities, 79 nonselective four-year public or not-for-profit universities, and 387 two-year public or not-for-profit colleges (Table A.1). Table A.3 shows the number of universities by tier and recession severity. I cluster standard errors at the university level.[16]

2.1 Results

For the 1987 birth cohort, the difference in median incomes between Ivy Plus and same-CZ Tier 3-5 alumni is an additional 12% higher in severely- versus mildly-affected CZs

[14]These are based on the National Center for Education Statistics selectivity measure. Given the number of universities, some Tier 3-5 institutions should be in the top quartile, and none will be open admissions. Among students starting postsecondary education in 2004, whose first degree was at a public two-year institution, median graduation age was 23 (U.S. Department of Education, National Center for Education Statistics, 2021*b*).

[15]Figure A.3 shows similar results requiring data only for the 1983 cohort, which yields a larger sample.

[16]These are generally larger for the coefficients of interest relative to those clustered at the CZ level, or those unclustered and robust to heteroskedasticity.

($p < .1$), relative to the 1983 cohort (Figure 1). For the 1990 birth cohort, the effect is 15% ($p < .05$). These results are based on 12 Ivy Plus universities. We similarly see a widening gap between Tier 1 (elite) and same-CZ Tier 3-5 universities, among cohorts graduating during the recession. For the 1987 birth cohort, the difference in median incomes is an additional 10% higher ($p < .01$) in severely- versus mildly-affected CZs, and 13% higher for the 1990 cohort, relative to the 1983 cohort. For the 1987 birth cohort, the Tier 1 to Tier 3-5 gap in median incomes in mildly-affected CZs was roughly 21%.

We do not see pre-trends, mitigating concerns that the effects are explained by pre-existing differential trends in severely- and mildly-affected areas. The results become significant only for the 1987 birth cohort, for which the median graduation would be in 2009, amid the highest unemployment rates of the Great Recession. This timing of the effects presents further evidence that these widening gaps are due to the recession.

The effects are slightly larger for the 1990 than for the 1987 birth cohort. The 1987 birth cohort graduated at a time with higher unemployment rates. However, by income measurement in 2014, roughly five years after graduation, some of the effects may have dissipated. The 1990 birth cohort graduated when unemployment rates were still substantially elevated relative to pre-recession levels (8.2% in May 2012 and 7.5% in May 2013), and we observe incomes roughly one to two years after graduation.

The gap between Tier 2 (highly selective) and Tier 3-5 universities widens more in severely-affected areas for the 1987 cohort, relative to the 1984 birth cohort, but not relative to the 1983 birth cohort.[17] We do not see any statistically significant evidence of a widening gap in severely-affected CZs between alumni of Tier 3-5 universities and nonselective four-year universities, or two-year institutions.[18] Results are similar without restricting to positive earners (Figure A.1), and we see very little evidence of an effect on the fraction

[17] We had chosen to compare to the 1983 birth cohort because of the possibility that some in the 1984 birth cohort graduated during the recession, which would lead to an underestimate. Here we see a decline between the 1983 and 1984 effect.

[18] Given the differences in median age at graduation, comparing Tier 3-5 to nonselective university graduates requires comparison to the 1982 cohort, which is a pre-recession cohort for both tiers.

with zero labor earnings (Figure A.2).

For Tier 3-5 universities, median incomes for the 1987 birth cohort were on average 4.5% lower in severely- relative to mildly-affected CZs, relative to the difference for the 1983 cohort.[19] Combining this with our estimates above suggests no differential effect of graduating in a severely-affected CZ by 2014, for graduates of more selective universities.

Strikingly, the Tier 1 to Tier 3-5 gap in the fraction of students with top quintile, top 10%, and top 5% earnings widens more for recession cohorts in severely-affected CZs. We do not see a widening gap in access to the third or fourth income quintiles (Figures 2a, 2b).[20] More than half of the effect on top quintile earnings appears explained by the effect on the likelihood of top 5% earnings. The Tier 1 to Tier 3-5 gap in likelihood of top 5% earnings increased an additional 3.7 percentage points in severely- versus mildly-affected CZs for the 1987 birth cohort; roughly 23% of the gap for this cohort in mildly-affected CZs.

2.1.1 Effects by Parental Income Quintile

In this section, I estimate equation (1) separately for students from each parental income quintile, and the dependent variables are the fraction of students from that parental income quintile who earn in the top 20%, and separately top 1%, of incomes for their birth cohort in 2014.[21]

This analysis is important for two reasons. First, a widening gap between lower-parental-income alumni of elite and less selective universities suggests the potential for improving income mobility by increasing lower-income students' access to more selective universities.

[19]This is based on the average of the dependent variables in 1987 and 1983 for Tier 3-5 universities in severely-, and separately mildly-, affected areas. I calculate these among CZs with Tier 3-5 and Tier 1 universities. Among 1974-2011 graduates, Altonji, Kahn and Speer (2016) find a roughly .04 log point earning loss three years after graduating in a large recession, and no earnings loss after seven years. Graduating in a large recession for post-2004 graduates is associated with a .02 to .06 log point earnings loss three years following graduation.

[20]Figures A.4 through A.7 show effects relative to all tiers. We note that these dependent variables are not calculated by restricting to positive earners. Figure A.8 shows similar results using mean earnings.

[21]The Chetty et al. (2020) mobility report card data do not provide the likelihood of top 10% or top 5% incomes conditional on parental income quintiles. I also show analogous results weighting by the size of the university-birth cohort-parental income quintile cell (Figures A.15 and A.16).

Second, estimating the specification separately by parental income quintile further mitigates concerns that differential changes in parental incomes explain the results.

Even conditional on parental income quintile, the results suggest graduating during the recession widens the gap between alumni of Tier 1 and Tier 3-5 universities in the likelihood of top quintile incomes (Figure 3). This widening gap is most evident for students with parents in the top income quintile.[22] Confidence intervals are wider for the lower parental income quintiles, likely in part because there are fewer students from these quintiles at Tier 1 universities – only 4% of students at Tier 1 universities have parents in income quintile 1, 5% in quintile 2, and 9% in quintile 3.

Nonetheless, we do see some suggestive evidence of a widening gap among lower-income students, in particular for students whose parents are in the third parental income quintile. There is also some evidence of an effect for students from the first parental income quintile, although the confidence intervals are large.

We similarly see widening gaps for alumni with parents in the top income quintile, between Ivy Plus and Tier 3-5 cohorts graduating during the recession. Magnitudes suggest there may also be effects for students from lower-parental-income quintiles (Figure A.9). We do not see clear evidence that the gap widens between Tier 3-5 and Tier 2 universities, nonselective four-year universities, or two-year colleges (Figures A.10, A.11 and A.12). The fact that Tier 3-5 alumni are not more or less resilient to the recession than alumni of highly selective (Tier 2) or nonselective universities is noteworthy, and potentially indicative of the mechanisms explaining elite university alumni resilience.

The gap in the likelihood of top 1% income widens for students from the top parental income quintile, comparing Ivy Plus and Tier 3-5 cohorts graduating during the recession in severely- versus mildly-affected CZs. There is suggestive evidence that this gap may also

[22]It does not appear this effect is driven by differential changes in the composition of parental income within the top quintile. These results control for cohort fixed effects interacted with fraction of parents in the top 10% of incomes and an indicator for severe recession. Further, Figure A.19 and A.20 show similar results including interactions between birth cohort, the indicator for severe recession, and fraction with parents in the top 5% of incomes and separately the top 1% of incomes.

have widened for students from middle- and lower-income families (Figure A.13). This result appears specific to Ivy Plus universities, as we do not observe it when comparing Tier 1 to Tier 3-5 universities (Figure A.14). This is perhaps not surprising, as the fraction of alumni with top 1% incomes is dramatically higher for Ivy Plus institutions (15%) even relative to Tier 1 universities (7%).

2.2 Potential Channels

The results show the Great Recession more adversely impacted students at less selective universities, especially affecting access to the top of the earnings distribution. This may be explained by differences in student characteristics across university selectivity tier, that are correlated with resilience. One possible channel is that parental income is correlated with resilience, and elite universities have more affluent students. Our identification strategy compares outcomes across tier, controlling for the potentially greater impact of parental income among recession cohorts in severely-affected areas. Further, we continue to see a widening gap once conditioning on parental income quintile. This suggests parental income differences do not completely explain the widening income gap between elite and less selective university cohorts graduating in recessions, in severely- versus mildly-affected areas.

Results are also not explained by differences in composition of majors across university selectivity tiers in 2000 (Tables A.2 and A.5). I estimate equation (1) additionally including interactions between birth cohort, major share, and $SevereRecession$ using the major classifications in Chetty et al. (2020). I include interactions with the three largest major shares in Tier 3-5 universities. Alternatively, I include interactions with all eight major shares, but omitting one. Both yield results similar to the main specification. Another potential explanation is different participation responses across university tier. As discussed, Figure A.2 shows there is no widening gap in the fraction of alumni with zero earnings. Figures A.31 and A.32 show similar results for males and females.

While I have controlled for changes in student composition along a number of dimensions

in the main specification, I also test whether differential changes in SAT scores might explain the results. We do not see differential changes in SAT score from 2001 to 2013 at Tier 1 relative to Tier 3-5 universities that are differentially larger in severely-affected CZs (Table A.6).[23][24]

Ability differences across tier may be an important explanation, and these data do not allow us to investigate this directly. I compare outcomes of very elite and Tier 3-5 university alumni in severely-affected CZs, and compare that to the difference in mildly-affected CZs. Thus, the triple difference ensures the results are not driven by differences in income by university selectivity tier, because of differences in income by ability. However, ability differences may lead to larger income differences in severely- relative to mildly-affected areas, if ability is correlated with resilience to recessions. The triple difference does not separately identify this channel. The results suggest that if ability differences across tier are playing a role, this is more important for higher-income students.[25]

Another potential explanation is that university selectivity has a causal effect on resilience to negative shocks. This is consistent with Chetty et al. (2020) finding that universities have important causal impacts, conditional on test score, parental income, and race. There are several ways in which elite universities may have causal effects on graduates' resilience to negative shocks. These include access to higher-wage firms that is more resilient to negative shocks, or more resilient access to higher-wage peer networks, or human capital that enables

[23]The mobility report cards include the average SAT scores by university in 2001 and 2013. As discussed in Table A.6, we only have SAT data for 368 of the 611 Tier 3-5 universities. There is some evidence of a widening gap in SAT scores between Ivy Plus and Tier 3-5 universities over the years from 2001 to 2013, that is larger in more severely-affected areas. However, in order to explain the income results, this differential increase would need to begin precisely for the 1987 cohort, and be flat beforehand.

[24]Students from elite universities may be more likely to continue their schooling rather than enter a labor market during a recession. Altonji, Kahn and Speer (2016) find a small effect of graduating during a recession on graduate degree attainment, but argue it is too small to affect sample selection across years of potential experience.

[25]There may be smaller ability differences across tier among lower-income students. Chetty et al. (2020) show that a greater fraction of lower-income high SAT/ACT score students attend less selective universities, compared to high income students. Alternatively, even if ability differences across tier are relatively similar for lower- and higher-income students, low-income, high-ability students may benefit less from elite universities. Chetty et al. (2020) show that the difference in outcomes between lower- and higher-income students within colleges is not explained by differences in SAT/ACT scores.

resilience. Understanding why elite universities have causal labor market impacts remains an important underexplored area. Next, I focus on one channel through which university selectivity may have a causal impact on graduates' resilience to negative shocks: prestigious firms stopped recruiting from less selective universities during the recession.

3 Employer Recruiting During the Great Recession

I collect a unique panel dataset of recruiting strategies using The Internet Archive: Wayback Machine. I focus on the Fortune 250 firms (2010), and Vault's 50 most prestigious consulting and banking firms in 2007 and 2008, respectively.[26]

Using the strategy described in Weinstein (2022), for each firm I identified whether the firm's website in the Fall of each year contained information on undergraduate target campuses, for 2000 through 2013. I denote whether a firm (f) recruits at a given university (j) in a given year (t) ($Recruit_{fjt}$), for each university in Princeton Review's The Best 376 Colleges (2012).[27] For consistency, for Fortune 250 firms, this is specifically whether they recruit for a business position, allowing me to study firms recruiting for similar jobs across university selectivity tier.

I code *Recruit* as missing if the page is nonarchived. However, a nonarchived page may reflect the page did not exist, and suggest no active recruiting.[28] Excluding these may underestimate recruiting declines during the recession. For robustness, I set to zero the observations set to missing for reasons that may reflect a lack of recruiting (reasons other than blocked pages or nonworking links).

I merge these recruiting data with birth-cohort university-level characteristics from the mobility report cards in Chetty et al. (2020). I collect panel data on firm office locations and calculate distance between the university and the firm's closest office in each year, as

[26]The 2007 ranking of banking firms contained very few firms.

[27]I exclude universities without IPEDS data and test scores, foreign universities, and service academies. I create one observation for the five Claremont Colleges.

[28]Observations with nonarchived recruiting pages, for reasons other than being blocked or nonworking links, increases during the recession (Figure A.35b).

described in Weinstein (2022) and in the appendix.

First, I estimate students' change in access to a firm during the Great Recession:

$$Recruit_{fjt} = \alpha_{fj} + \gamma_t + \epsilon_{fjt} \tag{2}$$

Observations are at the firm-university-year level. The dependent variable is an indicator for whether firm f recruits at university j in year t. I include firm-university pair fixed effects, and analyze within-pair changes in recruiting over time. I cluster standard errors at the firm and university level.

To be in the sample I require the firm-university pair had nonmissing recruiting data in 2007, so the effect in each year is relative to 2007 for that pair. I include only firms that recruit on at least one campus over the entire sample period, and only universities that attract at least one firm over the sample period. These are the firms and universities for which we would most expect changes during the recession. I show similar effects without this restriction (Table A.7). Table A.9 shows the firms, and years for each firm, in the sample.

I then analyze at which types of target campuses firms are pausing or ceasing their recruiting activities. I identify all firm-university pairs for which the firm recruited at the university in 2007, and identify those for which the firm did not recruit at the university in 2009 ($Dropped_{fj}$), peak and trough recruiting years (Figure 4a).[29] I estimate:

$$(Dropped_{fj} | Recruit_{fj2007} = 1) = \alpha_f + X_{fj}\beta + e_{fj} \tag{3}$$

I include firm fixed effects, and identify the average within-firm difference in the likelihood it drops one of its 2007 target campuses, associated with various university characteristics X, including all of these characteristics X in one regression. I use covariate values for the

[29]Consistent with the analysis in this section, less selective universities may generally be on the margin of attracting these prestigious firms. Thus, even before the recession, if there are firm-level idiosyncratic shocks that affect recruiting propensity, firms may be more likely to stop recruiting at their less selective target campuses. However, the recession is a shock in which we would expect many firms to drop their marginal targets in the same year, and so being at the margin is more costly.

1985 birth cohort. The variable *Dropped* equals one only if we are certain the firm did not recruit in 2009. I include only universities not reporting as a system.

Finally, I investigate which types of campuses experience the firm resume recruiting after leaving in 2009:

$$(Return_{fj}|Dropped_{fj} = 1) = \alpha_f + X_{fj}\beta + e_{fj} \tag{4}$$

The variable *Return* equals zero as long as *Recruit* is not equal to one in either 2010 or 2011. Because the sample size falls dramatically when including only pairs with $Dropped_{fj} = 1$, I include in (4) only the most significant predictors of being dropped as a target campus in equation (3).

On average, there is a statistically significant 1.4 percentage point decline in the likelihood that students have access to a given firm in 2008 relative to 2007 (Figure 4a and Table A.7). In 2009, this decline is over 2 percentage points ($p \leq .01$). The magnitude then lessens, but remains at around 1 percentage point ($p \leq .05$).[30] To test for dynamic effects, I estimate (2) requiring firm-university pairs have non-missing values in 2007, 2009, and 2013. We can rule out at the 10% level that the effect in 2009 is equal to the smaller, but not trivial, effect in 2013 (Figure A.34, Table A.7).[31]

Next, I find that among a firm's 2007 target campuses, it is 14 percentage points more likely to drop a non-Ivy Plus target campus in Barron's Tier 1 ($p \leq .05$), and 27-29 percentage points more likely to drop a highly selective or selective university ($p \leq .01$), relative to one of its Ivy Plus targets (Figure 4b and Table A.8). We can rule out the effects are equal for non-Ivy Plus Tier 1 and Tier 2 universities, and also that they are the same for non-Ivy Plus Tier 1, Tier 2, and Tiers 3-5 with $p = .11$.

Firms are 12 percentage points more likely to drop campuses that are 50 to 200 miles

[30]Declines are largest in relative terms for universities outside the Ivy Plus tier (Table A.7). Results are slightly larger in percentage terms when setting *Recruit* to zero instead of missing when the missing value may reflect lack of recruiting (Table A.7).

[31]The pre-recession increase, existing even imposing balance in 2006 and 2007, may reflect recruiting increases during an expansion, as well as increases in publicizing target campuses on firms' websites.

away, relative to those within 50 miles ($p \leq .01$). Universities more than 200 miles away are not significantly more likely dropped. This may reflect significant benefits from recruiting at these universities, given arguably quite high travel costs.

Conditional on university selectivity tier and distance, firms are 8.6 percentage points less likely to drop a target campus if the fraction of students with parents in the top income quintile is higher by one standard deviation. Fraction of students with parents in the top 1% has no additional effect. The coefficient on ln(students in cohort) implies that all else equal, firms are roughly 16 percentage points more likely to drop a university at the 25th percentile of size (1089 students) relative to the 75th percentile (3969 students).[32]

Students at less selective and farther universities lose access to these prestigious firms for a longer period of time. Among the campuses a firm dropped in 2009, it is 11 percentage points more likely to have returned to Ivy Plus campuses in 2010 or 2011, relative to less selective universities (Figure 4c and Table A.8). The firm is also 15 percentage points less likely to have returned to campuses that were more than 200 miles away. By 2013, there are no significant differences in likelihood of returning by university selectivity tier, though firms are still 14 percentage points less likely to have returned to campuses more than 200 miles away ($p \leq .1$) (Figure A.35a).[33]

These results show that recruiting by, and thus access to, high-wage firms becomes more concentrated at more selective universities during the recession. While this is suggestive that prestigious firms' recruiting decisions may partially explain the widening gap by university selectivity among recession cohorts, it is also not confirmatory. Recruiting in 2007 for the firms in the sample is more prevalent at elite relative to Tier 3-5 universities.[34] While the probability of dropping a target campus is higher for Tier 3-5 universities, the number of

[32]Defining dropped campuses as those with zero or missing recruiting in 2009 yields similar results (Figure A.36 and Table A.8).

[33]The dependent variable indicates whether the firm had started to recruit again at the university in 2010, 2011, 2012, or 2013. Figure A.37 and Table A.8 show similar results when setting *Return* to missing if *Recruit* is missing. However, the coefficient on Ivy Plus is less precisely estimated ($p = .1$), unsurprising given the smaller sample.

[34]Among the recruiting relationships in 2007 when estimating (3), 156 are at elite and 60 are at Tier 3-5 universities.

recruiting firms falls more at elite universities.

However, the sample firms are not the only ones enabling top earnings (for the 1987 birth cohort, the cutoff for top 5% earnings in 2014 was $68,100). Other high-wage firms may recruit more at Tier 3-5 universities, and more likely drop these as target campuses, similar to the firms in our sample. For example, of the 17 Fortune 250 companies in our sample, recruiting is more frequent at Tier 3-5 relative to elite universities, and a greater fraction of the Tier 3-5 target campuses are dropped during the recession. If other Fortune 250 companies exhibit similar behavior, this would generate larger losses in high-wage firm recruiting at Tier 3-5 universities.

If we had recruiting data for a larger fraction of high-wage firms, we could provide further direct support for this as a mechanism for the earnings effects in Figure 1, by estimating equation (1) with *Recruit* as the dependent variable. It seems intuitive that the differential decline in recruiting at less selective universities would be larger in severely-affected CZs, given our results above and that these high-wage firms recruit locally (Weinstein, 2022).

To the extent that losing access to high-wage firms represents some of the explanation for our findings, we would expect that when Tier 3-5 universities lose access to these firms there is a decline in graduates with top incomes. While these data are not optimal for testing this, I present suggestive evidence in the online appendix.

4 Conclusion

This paper presents new facts documenting that the income gap between elite and less selective university alumni widens for cohorts graduates during the Great Recession, comparing universities in severely- to mildly-affected areas. Using the Chetty et al. (2020) mobility report card data, we see a widening gap in median incomes, as well as a widening gap in access to the very top of the earnings distribution for their cohort. While this widening gap is most prominent for students from the top parental income quintile, there is also suggestive

evidence that the gap widens for middle- and lower-income students. The results may reflect ability differences across tier that are correlated with resilience, but it could also reflect that university selectivity has a causal effect on enabling resilience to recessions.

There is still limited evidence highlighting the ways in which elite universities may have causal labor market impacts. I highlight one channel through which university selectivity could have a causal effect on resilience to negative shocks: prestigious firms differentially stopped recruiting at less selective universities during the recession. I use a unique dataset of employer recruiting decisions for 65 prestigious finance, consulting, and Fortune 250 companies.

If the recession's differential impact by university selectivity reflects causal effects of university selectivity, then this is another way in which changing where students attend college could affect economic mobility, as suggested by Chetty et al. (2020). Understanding whether, and why, affluent students benefit more from elite universities remains an important area for research and policy. To the extent that the results reflect ability differences across selectivity tier, they also suggest which graduates are most at risk of adverse impacts during recessions and in potential need of support from policymakers or their universities. As one example, less elite universities might find ways to allow unlucky recession graduates to participate in on-campus recruiting, once more firms have returned to campus.

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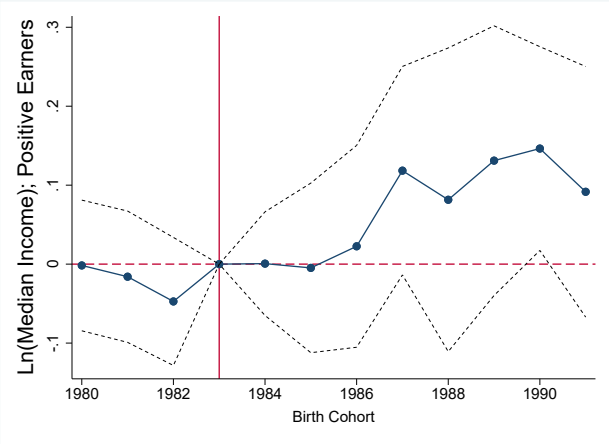
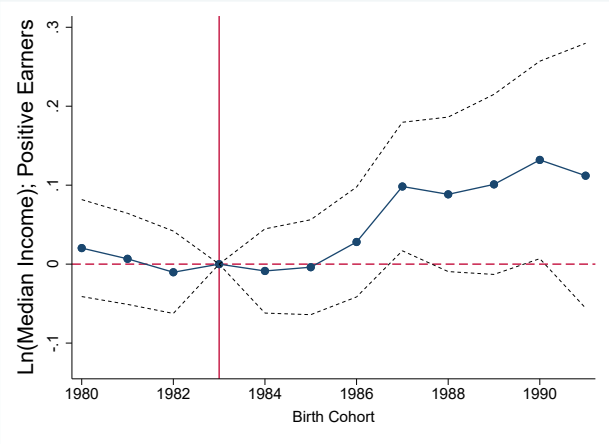
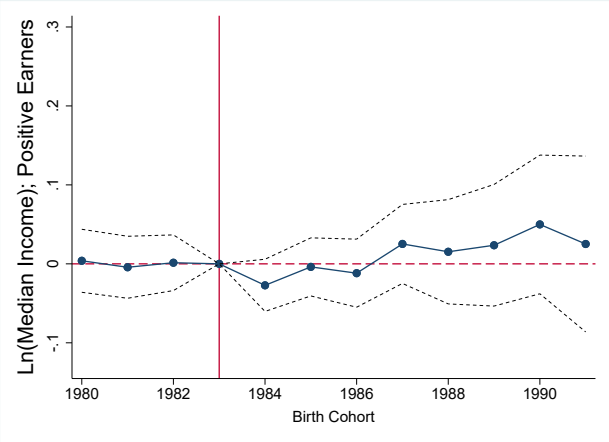
Figure 1: **Recession Effects by University Selectivity, Relative to Tier 3-5 (Selective) Universities: Triple Difference with CZ-Cohort Fixed Effects**



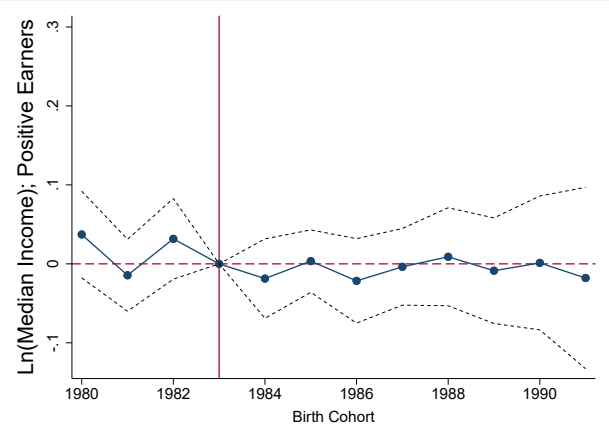
(a) Ivy Plus Universities



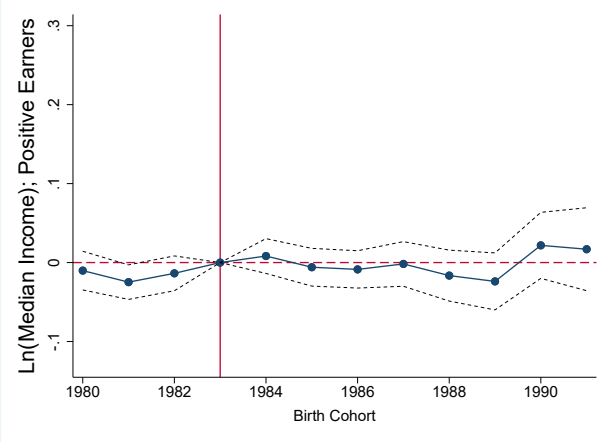
(b) Tier 1 Universities (Elite)



(c) Tier 2 Universities (Highly Selective)



(d) Nonselective Four-Year Univ. (Public/NFP)

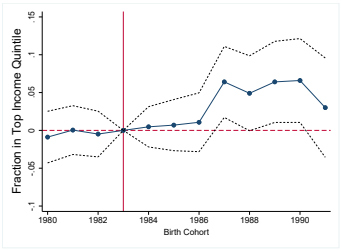


(e) Two-Year Colleges (Public/NFP)

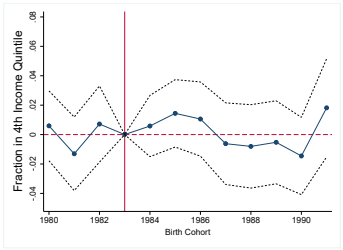
Notes: Plots are from the same regression, equation (1), and show coefficients on the interaction between birth cohort fixed effects, university tier, and an indicator for severe recession in the CZ from 2007 to 2009. Dashed lines show 95% confidence intervals, constructed using standard errors clustered at the university level. I include only universities that have data for each cohort. Sample size is 14,652 and R-squared is .98. See text for details.

Figure 2

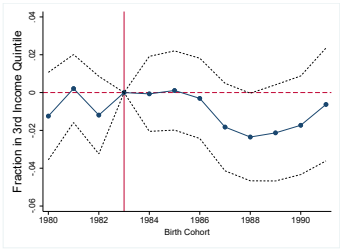
(a) **Likelihood of Earnings in Each Quintile, Tier 1 (Elite) Relative to Tier 3-5 (Selective) Universities: Triple Difference with CZ-Cohort Fixed Effects**



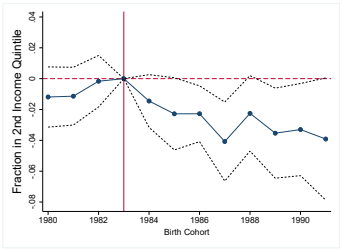
Earnings in Quintile 5



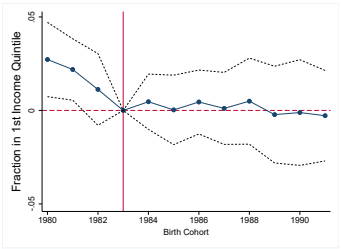
Earnings in Quintile 4



Earnings in Quintile 3

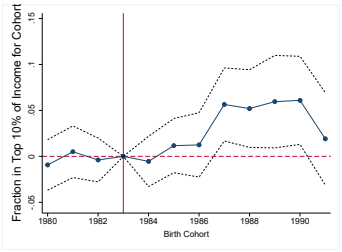


Earnings in Quintile 2

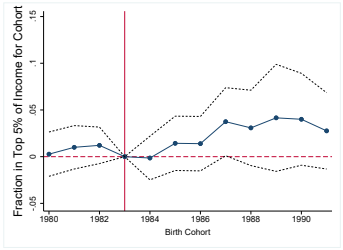


Earnings in Quintile 1

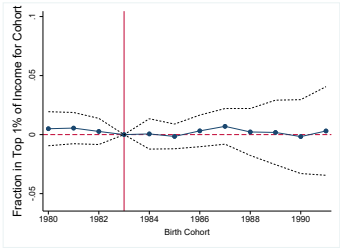
(b) **Likelihood of Top Earnings, Tier 1 (Elite) Relative to Tier 3-5 (Selective) Universities: Triple Difference with CZ-Cohort Fixed Effects**



Top 10% Earnings



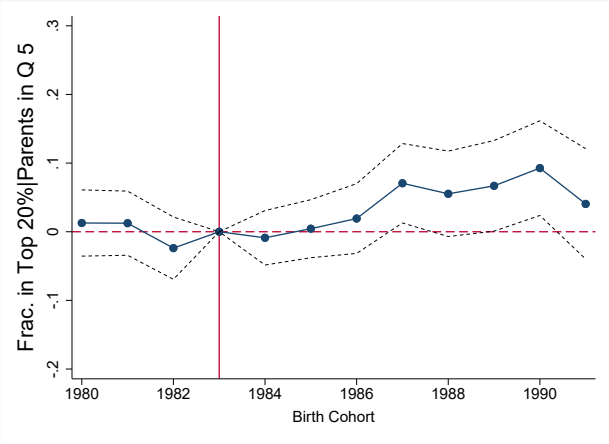
Top 5% Earnings



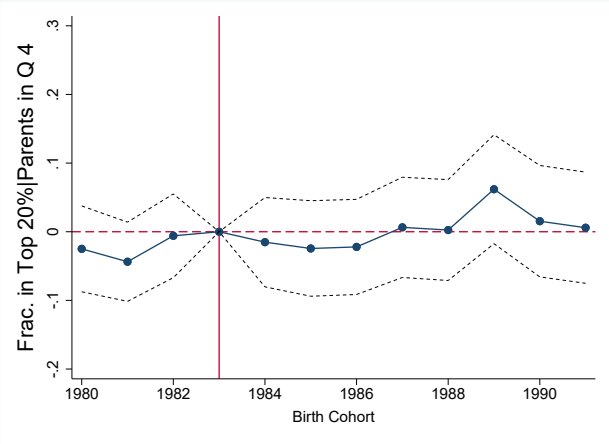
Top 1% Earnings

Notes: Plots are analogous to those in Figure 1, but with a different dependent variable. Figures A.4 through A.7 show effects on top quintile, top 10%, top 5%, and top 1% earnings for each tier relative to Tier 3-5. See Figure 1 notes and text for details.

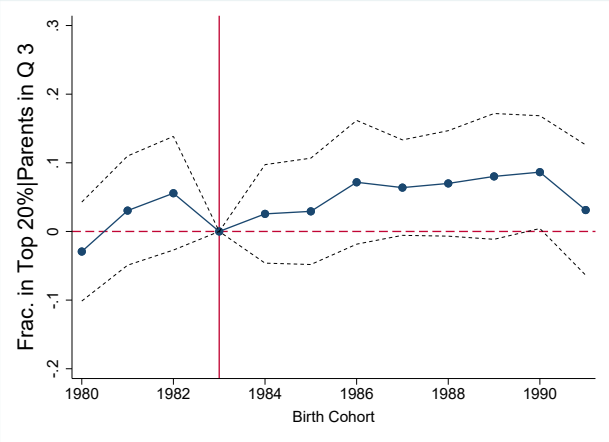
Figure 3: **Likelihood of Top Quintile Income, Conditional on Parental Income Quintile: Tier 1 (Elite) Relative to Selective Universities (Tiers 3-5)**



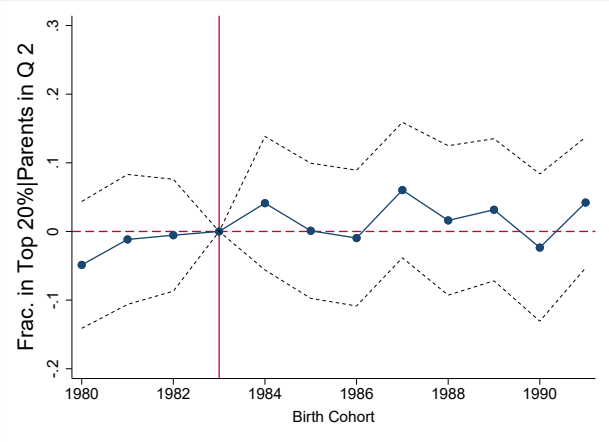
Parental Income in Quintile 5



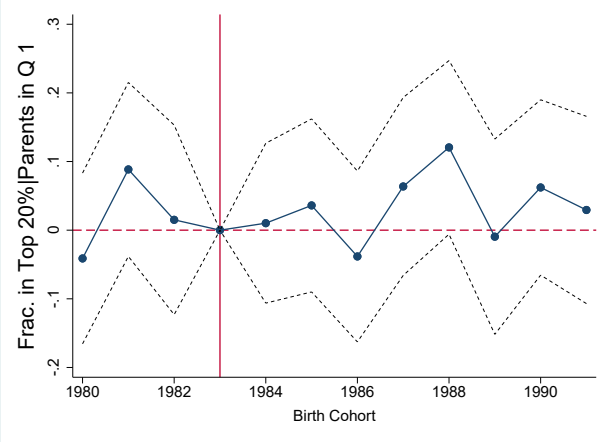
Parental Income in Quintile 4



Parental Income in Quintile 3



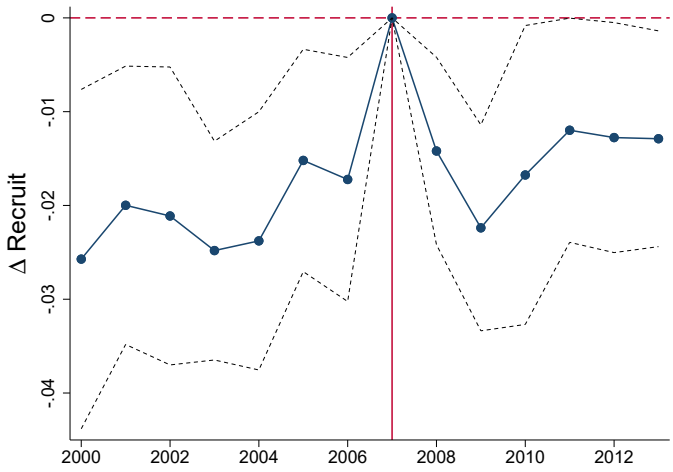
Parental Income in Quintile 2



Parental Income in Quintile 1

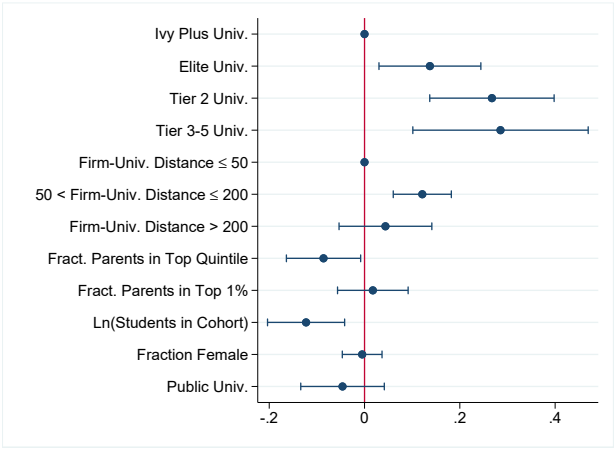
Note: Each plot is from a different regression, in which I estimate equation (1) and the dependent variable is the likelihood of income success conditional on parental income in the given quintile. I show coefficients on the interaction between birth cohort fixed effects, university tier, and an indicator for severe recession in the CZ from 2007 to 2009. See Figure 1 and text for details.

Figure 4: **Employer Recruiting During Recessions**

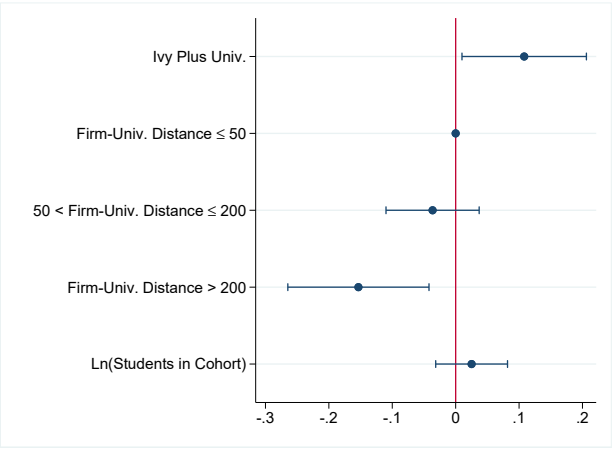


(a) Changes in Recruiting Over Time,
within Firm-University Pairs
Mean $Recruit_{2007} = .057$

Predictors of Dropped and Re-initiated Target Campuses



(b) Dropped Target Campuses in 2009,
After Recruiting in 2007
Mean $Dropped_{IvyPlus} = .364$



(c) Campuses Added Back in 2010 or 2011,
After Being Dropped in 2009
Mean $Added_{NonIvy} = .087$

Notes: Dashed lines and bars show 95% confidence intervals, and standard errors are clustered at the firm and university level. Regressions include only firm-university pairs with data in 2007. Plot 4a shows estimates from equation (2). Plot 4b shows results from estimating equation (3), including all firm-university pairs for which $Recruit = 1$ in 2007, and including all covariates in the same regression. The coefficients on university tier are relative to Ivy Plus universities. Coefficients on firm-university distance are relative to distance less than or equal to 50 miles. The following are standardized so they are mean zero and standard deviation one in the regression sample: fraction with parents in the top quintile, and in the top 1% of the income distribution, and fraction that is female. Standard errors are clustered at the firm and university level, and ranges show 95% confidence intervals. Covariate values correspond to the 1985 birth cohort. Plot 4c shows results from estimating equation (4). The sample includes all firm-university pairs for which $Recruit = 1$ in 2007 and $Recruit = 0$ in 2009. Coefficients on Ivy Plus universities are relative to other university tiers. The mean of the dependent variable in Plot 4b is .549, and .118 in Plot 4c. Regressions for plots 4b and 4c include firm fixed effects, and exclude universities for which the reporting of mobility report card variables is for multiple universities in a system.

A Appendix

A.1 Employer Recruiting and Location Data

I collect locations for each firm in each year, similarly to the collection of recruiting strategies. I obtain the latitude and longitude of the office locations using the Census Gazetteer place and county subdivision files, merging on the city name and state. For cities that could not be merged, I manually obtained the latitude and longitude. I additionally obtain university latitude and longitude from IPEDS.

For each firm/university pair, in each year I calculate the distance between the university and every office location of the firm in that year.[35] In addition to some firms having unarchived or broken location pages, there is some variation within firms across years in the types of locations they report. I code location as missing for firm/years in which the reporting of locations seems inconsistent with other years.[36]

Some universities report as a system, and the tier is associated with the largest university in the system. In estimating equation (2), I include the 21 universities reporting as a system, given they are likely the largest in their system based on their inclusion in the Princeton Review's ranking of the best 362 universities. Results are also very similar when excluding these universities.

A.2 Losing Access to Prestigious Firms and Income Success

To the extent that losing access to high-wage firms explains some of our findings, we would expect that when Tier 3-5 universities lose access to these firms there is a decline in alumni with top incomes. In this section, I analyze the impact of losing access to prestigious firms on the fraction of alumni with top earnings in 2014. This analysis is more suggestive and

[35]Specifically, I compute the lengths of the great circle arcs connecting each university and each office location for a given firm, located on the surface of a sphere. The arc length, measured in degrees, is then converted to statute miles as measured along a great circle on a sphere with radius 6371 kilometers, the mean radius of the earth. These calculations are performed using the arclen and deg2sm commands in MATLAB.

[36]Details are available upon request.

limited for a number of reasons.

First, I only have recruiting data for a limited number of high-wage firms. Thus, there may be Tier 3-5 universities that lost access to high-wage firms, but I am not capturing those in my data. Second, ideally we would have a measure of the scale of hiring by the firm on campus before the recession. Losing access to a firm that had been hiring one student should have different implications than losing access to a firm that had been hiring 10. Further, the data do not allow me to confirm that additional students in the top earnings percentiles from pre-recession cohorts were hired by firms that stopped recruiting during the recession. Finding an effect would be consistent with losing access to these prestigious firms. Finally, other factors could affect outcomes between graduation and 2014. However, the literature establishing recessions' persistent effects makes this analysis more compelling.

I merge the recruiting dataset to the mobility report cards, and analyze the effect of universities losing access to at least one firm between 2007 and 2009. I estimate:

$$Y_{j_st} = \beta_t LostAccess + \gamma_{st} + \kappa_j + \rho_t Z_{jt} + X_{jt}\delta + u_{j_st} \tag{5}$$

Observations are at the university-birth cohort level. Because we are interested in whether the differential loss of access at Tier 3-5 universities affects earnings, I include only Tier 3-5 universities in the regression sample. The effects of losing access to firms may differ across selectivity tier.

The dependent variable is the fraction of students in the top of the income distribution for their birth cohort, among students in birth cohort t at university j in location s. I show results for the following dependent variables: fraction of students in the top quintile, top 10%, top 5%, and top 1% of income for their birth cohort. We include university fixed effects, and analyze the within-university difference in income success across birth cohorts, and the differential effect for universities that lost access to at least one prestigious finance, consulting, or Fortune 250 company between 2007 and 2009. On average, the universities contributing to the identification lost access to roughly two firms between 2007 and 2009.

Given this definition of lost access, graduates in 2008 and 2009 should be most affected as these were the graduates who lost on-campus access; 2007 graduates could be affected as recent hires. This suggests potential effects for the 1985 through 1987 birth cohorts. Including location by cohort fixed effects (γ_{st}), we compare this difference to the difference for other Tier 3-5 universities in the same area. I show results including CZ-cohort fixed effects, and separately state-cohort fixed effects.

I balance the sample on university-cohort. I do not include universities with income reported for the university system. I include in X the same variables I include in equation (1).[37] I also include interactions between cohort fixed effects and the following variables Z_{jt}: share of students with parents in the second income quintile, the third, fourth, and fifth, and the share with parents in the top 10% of incomes. This mitigates concerns that universities that are dropped are also experiencing differential changes in parental income composition timed with the period in which they are dropped. I cluster standard errors at the university level.

I report results relative to the 1984 birth cohort. The Tier 3-5 universities in this sample are drawn from the Princeton Review's Best 376 Colleges. Thus, they may be more selective than other Tier 3-5 universities, and have lower median graduation ages. For this sample of universities, it is more likely that students in the 1984 birth cohort are graduating before the recession, relative to the full sample of Tier 3-5 universities in equation (1). Moreover, the median graduation for the 1985 birth cohort from some of these universities may be before the recession. However, if the universities losing access are more likely to have lower ages at graduation, comparing to the 1985 cohort could yield biased results. Thus, I compare to the 1984 birth cohort.

The fraction of students with top quintile and top 10% earnings falls differentially for the 1987 birth cohort at Tier 3-5 universities losing access to prestigious firms, relative to other

[37]Tables A.11 and A.12 show some evidence of differential trends in X for dropped target campuses (through the 1991 birth cohort). It does not appear they explain the differential income effects, given that in some cases the trends start after the 1987 cohort, or they increase in magnitude after the 1987 cohort, while many of the income effects decrease in absolute value from 1988-1991.

Tier 3-5 universities in the same CZ or same state that do not lose access, relative to the 1984 birth cohort. The magnitude for both the top quintile and top 10% is roughly 1 percentage point when including CZ-birth cohort fixed effects, but it is not statistically significant from zero. Magnitudes are roughly 1.5 percentage points when including state-birth cohort fixed effects, and the effects are statistically significant at the 10% level (top quintile) and 5% level (top 10%). There is less strong evidence of an effect on top 5% and top 1% earnings. The effect for top 1% earnings appears for the 1986 cohort, but becomes smaller in magnitude for the 1987 cohort.

These results present some evidence that Tier 3-5 alumni are negatively affected by losing access to high-wage firms. However, for the reasons discussed above, these data are not optimal for analyzing this question, and these results should be treated only as suggestive.

Table A.1: Summary Statistics by University Tier, 1987 Birth Cohort

University Tier	Ivy Plus	Tier 1, excl. Ivy (Elite)	Tier 2 (Highly Selective)	Tiers 3-5 (Selective)	Nonselect. Four Year (Pub/NFP)	Two Year (Pub/NFP)
Total universities in sample	12	59	73	611	79	387
Median earnings (positive earners), 2014	48,017	43,678	42,533	34,183	26,878	24,203
	[7,338]	[8,593]	[9,954]	[6,343]	[5,143]	[3,209]
Mean earnings, 2014	64,789	48,657	43,896	34,441	26,366	23,813
	[11,872]	[11,064]	[10,287]	[6,717]	[5,111]	[3,374]
Fraction of graduates with top 20% earnings	0.51	0.48	0.48	0.33	0.21	0.16
	[.07]	[.11]	[.14]	[.11]	[.09]	[.06]
Fraction of graduates with top 10% earnings	0.39	0.33	0.3	0.17	0.09	0.07
	[.07]	[.11]	[.14]	[.09]	[.05]	[.03]
Fraction of graduates with top 5% earnings	0.29	0.21	0.17	0.08	0.04	0.03
	[.07]	[.09]	[.1]	[.06]	[.03]	[.02]
Fraction of graduates with top 1% earnings	0.15	0.07	0.04	0.01	0.01	0
	[.03]	[.04]	[.03]	[.02]	[.01]	[0]
Number of students	1,468	1,093	1,449	1,066	1,088	1,335
	[600]	[1,055]	[1,639]	[1,266]	[1,327]	[1,151]
Admissions rejection rate, 2013	0.91	0.73	0.47	0.33	0.33	.
	[.03]	[.11]	[.14]	[.14]	[.18]	[.]
Average SAT, 2001	1429	1327	1207	1037	.	.
	[36]	[64]	[59]	[89]	[.]	[.]
Average annual cost of attendance, 2000	25,488	21,511	16,651	9,641	6,255	1,971
	[618]	[6,208]	[7,282]	[6,152]	[6,499]	[1,475]
Flagship University	0	0.03	0.07	0.02	0	0
	[0]	[.18]	[.25]	[.15]	[0]	[0]
Public University	0	0.08	0.22	0.43	0.56	0.99
	[0]	[.28]	[.42]	[.5]	[.5]	[.11]
Instructional expenditures per student, 2000	27,306	16,349	8,774	4,890	4,146	2,522
	[8,935]	[8,957]	[2,955]	[2,039]	[3,312]	[1,140]
Fraction with parents in income quintile 1	0.04	0.04	0.04	0.08	0.13	0.16
	[.01]	[.02]	[.02]	[.06]	[.09]	[.07]
Fraction with parents in income quintile 2	0.06	0.05	0.07	0.13	0.17	0.2
	[.01]	[.02]	[.03]	[.06]	[.07]	[.05]
Fraction with parents in income quintile 3	0.09	0.09	0.12	0.19	0.21	0.24
	[.01]	[.02]	[.03]	[.05]	[.05]	[.04]
Fraction with parents in income quintile 4	0.14	0.15	0.2	0.26	0.24	0.25
	[.02]	[.03]	[.04]	[.06]	[.06]	[.06]
Fraction with parents in income quintile 5	0.67	0.66	0.57	0.33	0.24	0.16
	[.05]	[.07]	[.09]	[.14]	[.14]	[.08]
Fraction with parents in top 1% of incomes	0.15	0.12	0.07	0.01	0.01	0
	[.04]	[.05]	[.05]	[.02]	[.02]	[0]
Fraction female	0.5	0.54	0.54	0.58	0.53	0.52
	[.02]	[.14]	[.13]	[.13]	[.15]	[.06]

Notes: Summary statistics for the 1987 birth cohort of universities in the regression sample for Figure 1. Standard deviations are in brackets. Not all universities have data for each variable. I omit average SAT score in columns (5) and (6), and average rejection rate for column (6) because of the small sample sizes. Only 15 of the 79 nonselective four-year universities, and three of the 387 two-year colleges, have SAT scores. Forty of the nonselective universities, and seven of the two-year colleges, have rejection rates. See text for details.

Table A.2: Distribution of Majors by University Tier, 1987 Birth Cohort

University Tier	Ivy Plus	Tier 1, excl. Ivy (Elite)	Tier 2 (Highly Selective)	Tiers 3-5 (Selective)	Nonselect. Four Year (Pub/NFP)	Two Year (Pub/NFP)
Total universities in sample	12	59	73	611	79	387
Percent Arts and Humanities majors	15.6	20.2	17.3	9.7	16.8	1.6
	[6.7]	[9.7]	[13.1]	[7.3]	[33.1]	[2.7]
Percent Business majors	4	7.8	16.4	23.7	13.5	20.5
	[7.3]	[11.1]	[16.9]	[13.1]	[16.3]	[8.6]
Percent Health and Medicine majors	1.1	2	2.8	8.1	11.5	21.7
	[2.]	[4.3]	[5.]	[10.2]	[15.9]	[11.4]
Percent Multi/Interdisciplinary Studies majors	6.1	5.6	5.8	7.4	28.4	26.4
	[4.5]	[4.9]	[6.]	[8.8]	[29.6]	[18.]
Percent Public and Social Services majors	1.9	0.6	1.4	5.5	8.2	6.8
	[3.]	[1.2]	[2.4]	[6.8]	[18.9]	[7.5]
Percent STEM majors	35.3	28.2	24.2	15.1	10	10.3
	[17.5]	[18.4]	[22.4]	[11.8]	[13.2]	[7.3]
Percent Social Sciences majors	36	35.4	31.7	29.8	5	3.2
	[11.6]	[13.5]	[14.5]	[13.1]	[11.3]	[5.9]
Percent Trades and Personal Services majors	0	0	0	0.7	6.6	9.6
	[0]	[0]	[.1]	[4.3]	[15.2]	[10.8]

Notes: Summary statistics for the 1987 birth cohort of universities in the regression sample for Figure 1. Standard deviations are in brackets. See text for details.

Table A.3: Overlap in Commuting Zone, Across University Tier

	Severe Recession		Mild Recession	
	Univ. in Sample	Univ. in CZ with Tier 3-5 Univ.	Univ. in Sample	Univ. in CZ with Tier 3-5 Univ.
Ivy Plus	8	8	4	4
Tier 1 excluding Ivy (Elite)	36	32	23	22
Tier 2 (Highly Selective)	41	35	32	30
Tiers 3-5 (Selective)	402	402	209	209
Nonselective four year (Public/NFP)	56	52	23	20
Two year (Public/NFP)	278	248	109	96

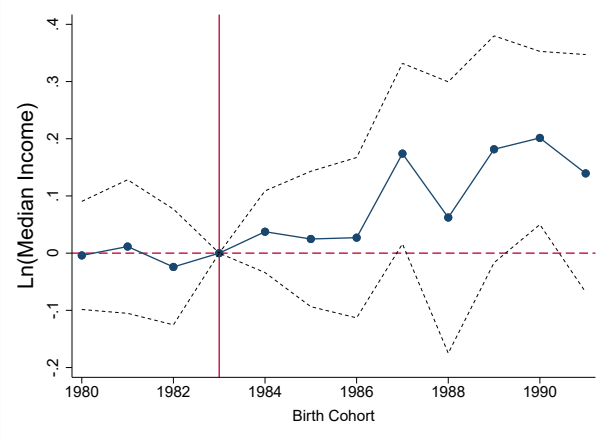
Notes: This table shows the number of universities in the main regression sample (equation (1)), by selectivity tier, whether they are located in a severe- or mild-recession CZ, and whether they are in the same CZ as a Tier 3-5 university. See text for details.

Table A.4: Overlap in Commuting Zone, Across University Tier, 1983 Balance

	Severe Recession		Mild Recession	
	Univ. in Sample	Univ. in CZ with Tier 3-5 Univ.	Univ. in Sample	Univ. in CZ with Tier 3-5 Univ.
Ivy Plus	8	8	4	4
Tier 1 excluding Ivy (Elite)	38	36	25	25
Tier 2 (Highly Selective)	51	46	36	33
Tiers 3-5 (Selective)	544	544	302	302
Nonselective four year (Public/NFP)	94	84	38	33
Two year (Public/NFP)	398	354	180	155

Notes: This table shows the number of universities in the regression sample requiring the university has data in 1983 (equation (1)), by selectivity tier, whether they are located in a severe- or mild-recession CZ, and whether they are in the same CZ as a Tier 3-5 university. See text for details.

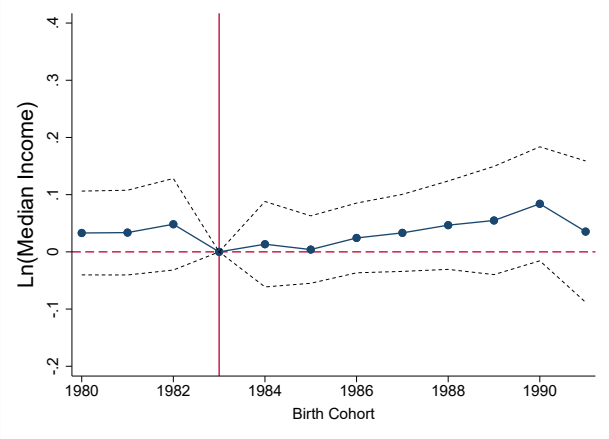
Figure A.1: **Recession Effects by University Selectivity, Relative to Tier 3-5 (Selective) Universities: Triple Difference with CZ-Cohort Fixed Effects, Not Restricting to Positive Earners**



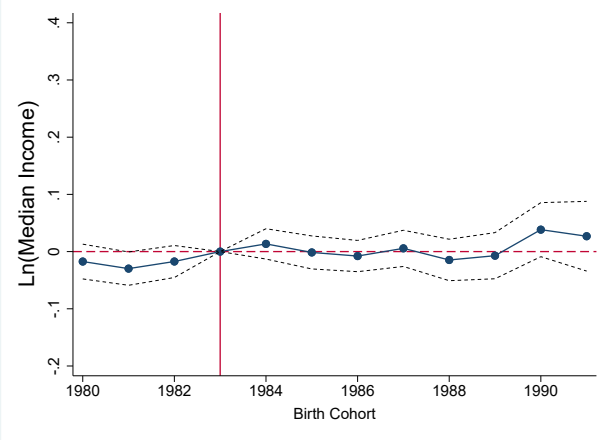
(a) Ivy Plus Universities

(b) Tier 1 Universities (Elite)

(c) Tier 2 Universities (Highly Selective)



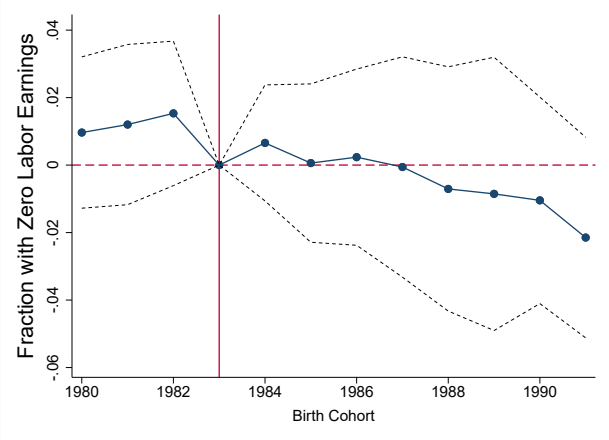
(d) Nonselective Four-Year Univ. (Public/NFP)



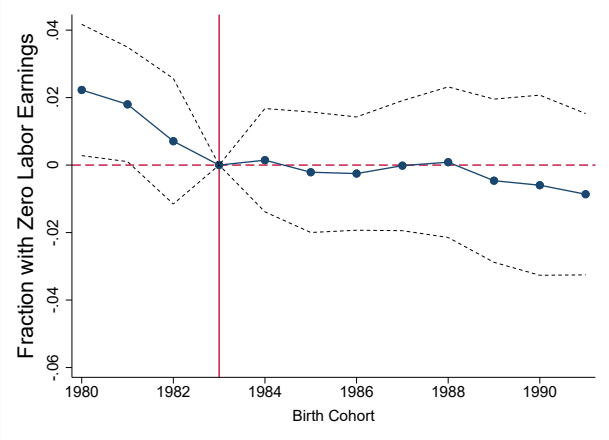
(e) Two-Year Colleges (Public/NFP)

Notes: Plots are analogous to those in Figure 1, but the dependent variable is log of median income without restricting to positive earners. There is one nonselective university that does not have balanced data for this variable, but does when restricting to positive earners, so the sample size in this regression is 14,640. See Figure 1 for details.

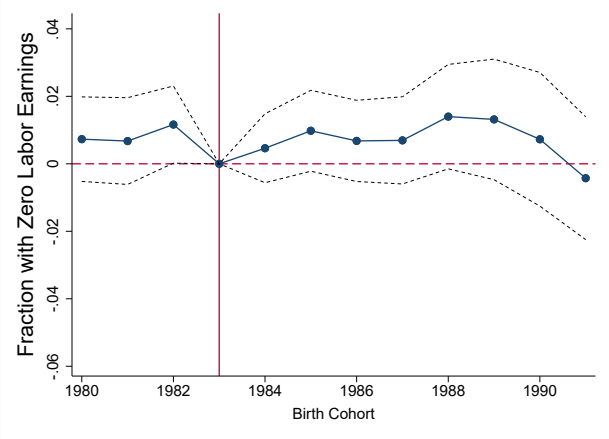
Figure A.2: **Recession Effects by University Selectivity, Relative to Tier 3-5 (Selective) Universities: Triple Difference with CZ-Cohort Fixed Effects, Fraction with Zero Labor Earnings**



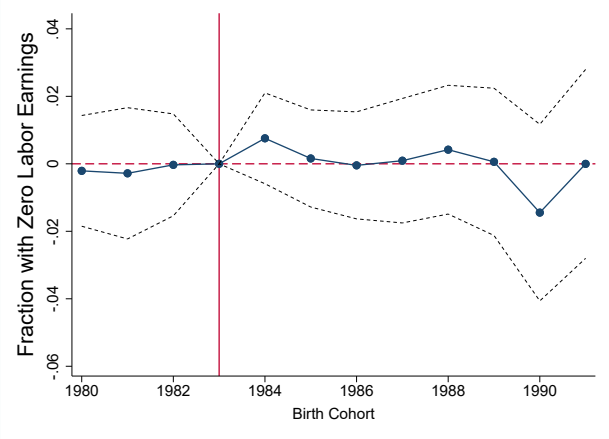
(a) Ivy Plus Universities



(b) Tier 1 Universities (Elite)



(c) Tier 2 Universities (Highly Selective)

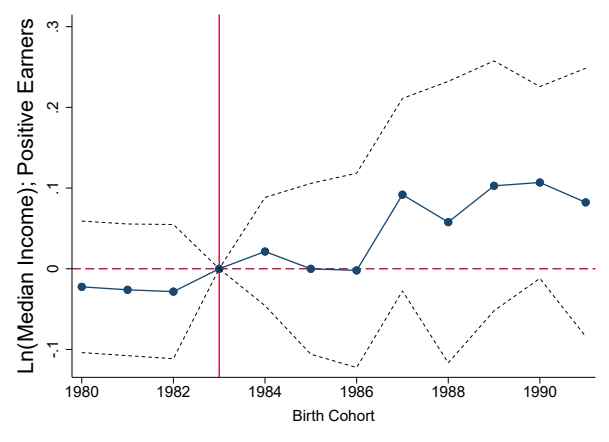


(d) Nonselective Four-Year Univ. (Public/NFP)

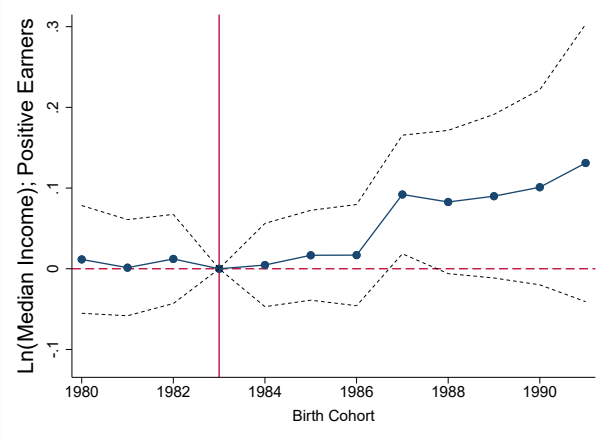
(e) Two-Year Colleges (Public/NFP)

Notes: Plots are analogous to those in Figure 1, but the dependent variable is the fraction of students with zero labor earnings. See Figure 1 for details.

Figure A.3: **Recession Effects by University Selectivity, Relative to Tier 3-5 (Selective) Universities: Triple Difference with CZ-Cohort Fixed Effects, Sample with Data for 1983 Birth Cohort**

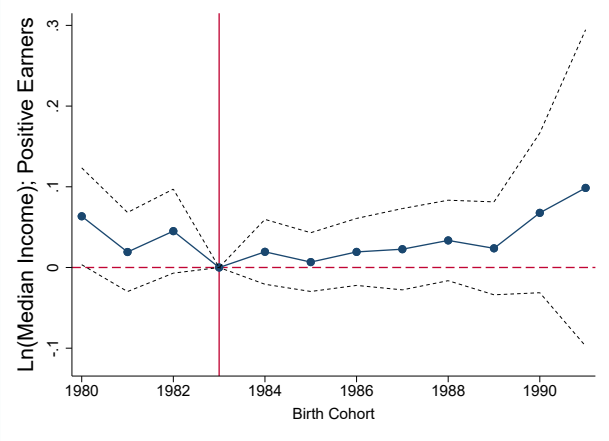


(a) Ivy Plus Universities

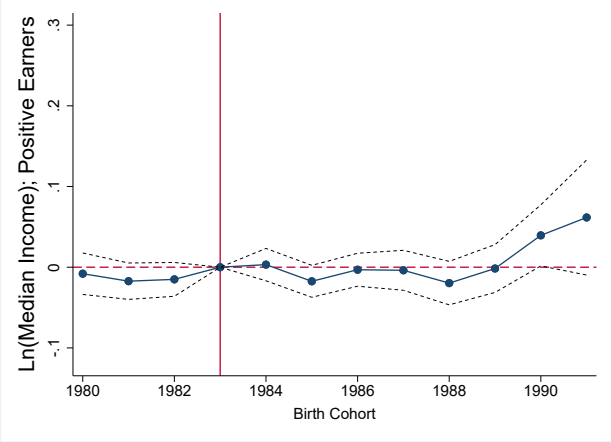


(b) Tier 1 Universities (Elite)

(c) Tier 2 Universities (Highly Selective)



(d) Nonselective Four-Year Univ. (Public/NFP)

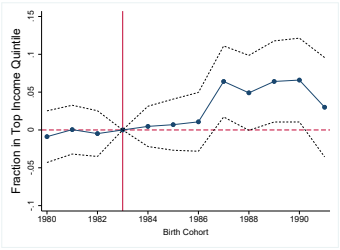


(e) Two-Year Colleges (Public/NFP)

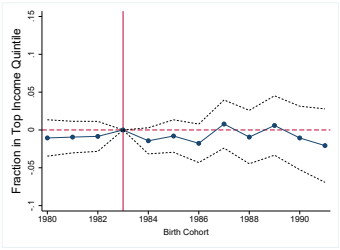
Notes: Plots are analogous to those in Figure 1, but the regression includes only universities that have data for the 1983 cohort, rather than requiring the sample is completely balanced. Sample size is 19,297 and R-squared is .976. See Figure 1 notes and text for details.

Figure A.4: **Likelihood of Top Quintile Earnings, Relative to Tier 3-5 (Selective) Universities: Triple Difference with CZ-Cohort Fixed Effects**

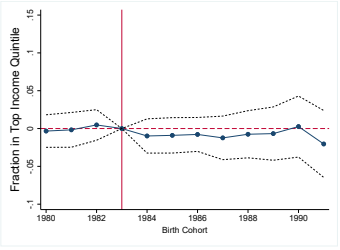
(a) Ivy Plus Universities



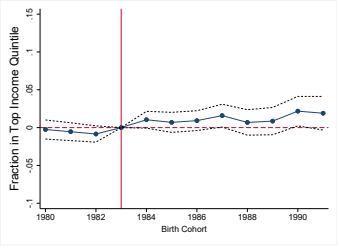
(b) Tier 1 Universities (Elite)



(c) Tier 2 Universities (Highly Selective)



(d) Nonselective Four-Year Univ. (Public/NFP)

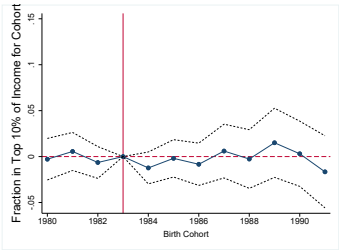


(e) Two-Year Colleges (Public/NFP)

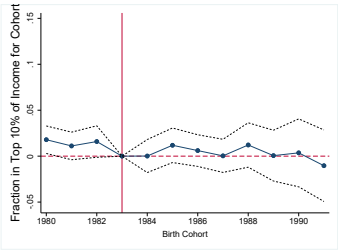
Figure A.5: **Likelihood of Top 10% Earnings, Relative to Tier 3-5 (Selective) Universities: Triple Difference with CZ-Cohort Fixed Effects**

(a) Ivy Plus Universities

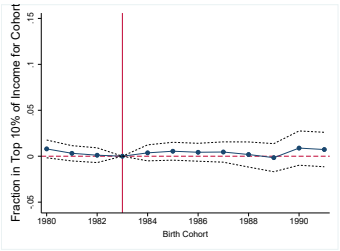
(b) Tier 1 Universities (Elite)



(c) Tier 2 Universities (Highly Selective)



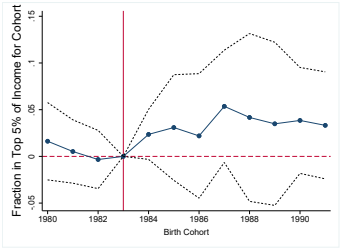
(d) Nonselective Four-Year Univ. (Public/NFP)



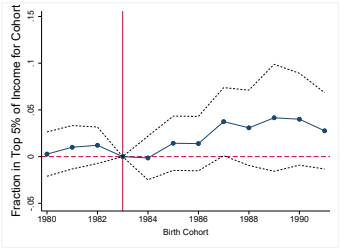
(e) Two-Year Colleges (Public/NFP)

Notes: Plots are analogous to those in Figure 1, but with a different dependent variable. See Figure 1 notes and text for details.

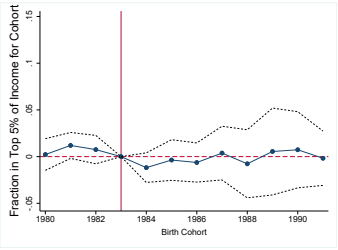
Figure A.6: **Likelihood of Top 5% Earnings, Relative to Tier 3-5 (Selective) Universities: Triple Difference with CZ-Cohort Fixed Effects**



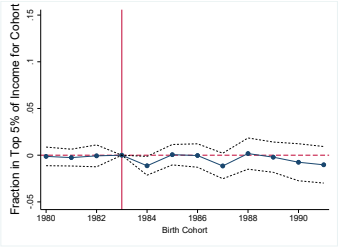
(a) Ivy Plus Universities



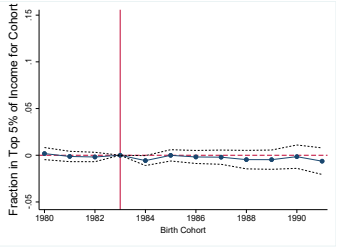
(b) Tier 1 Universities (Elite)



(c) Tier 2 Universities (Highly Selective)

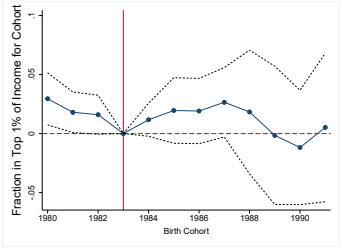


(d) Nonselective Four-Year Univ. (Public/NFP)

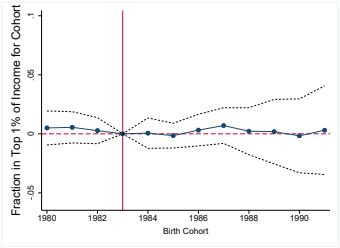


(e) Two-Year Colleges (Public/NFP)

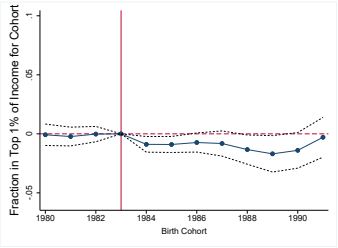
Figure A.7: **Likelihood of Top 1% Earnings, Relative to Tier 3-5 (Selective) Universities: Triple Difference with CZ-Cohort Fixed Effects**



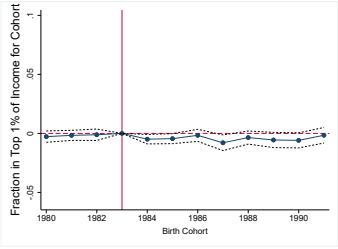
(a) Ivy Plus Universities



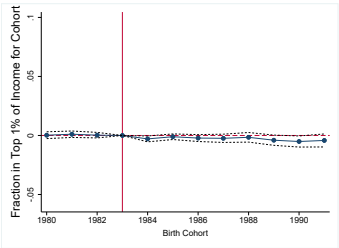
(b) Tier 1 Universities (Elite)



(c) Tier 2 Universities (Highly Selective)



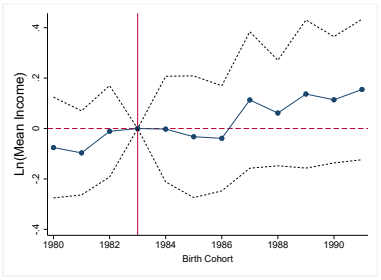
(d) Nonselective Four-Year Univ. (Public/NFP)



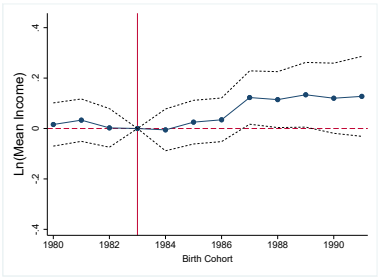
(e) Two-Year Colleges (Public/NFP)

Notes: Plots are analogous to those in Figure 1, but with a different dependent variable. See Figure 1 notes and text for details.

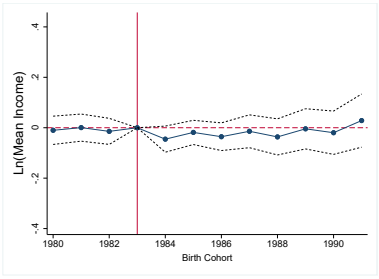
Figure A.8: **Average Income by University Selectivity, Relative to Tier 3-5 (selective) universities: Triple Difference with CZ-Cohort Fixed Effects**



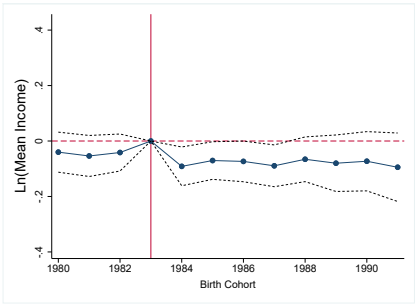
(a) Ivy Plus Universities



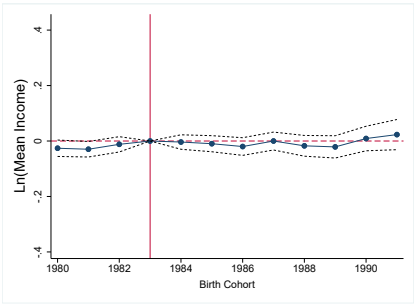
(b) Tier 1 Universities (Elite)



(c) Tier 2 Universities (Highly Selective)



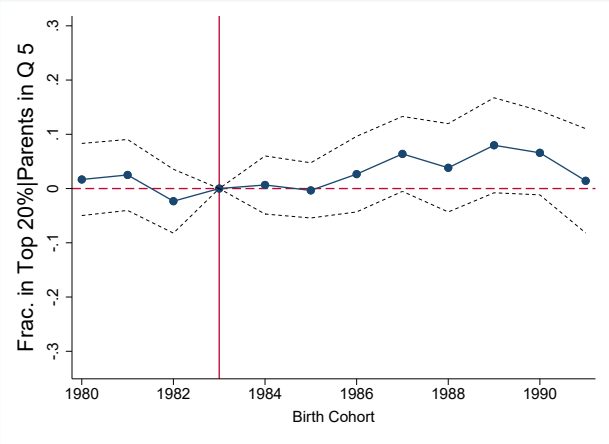
(d) Nonselective Four-Year Univ. (Public/NFP)



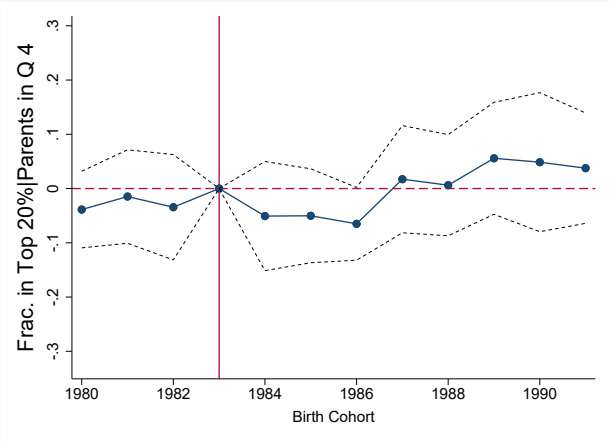
(e) Two-Year Colleges (Public/NFP)

Notes: Plots are analogous to those in Figure 1, but with a different dependent variable. Table A.1 shows that for the Tier 1 and Ivy Plus universities, mean earnings is substantially higher than the median among positive earners, as is the standard deviation. Chetty et al. (2020) show the mean prediction error is higher for mean earnings. See Figure 1 notes and text for details.

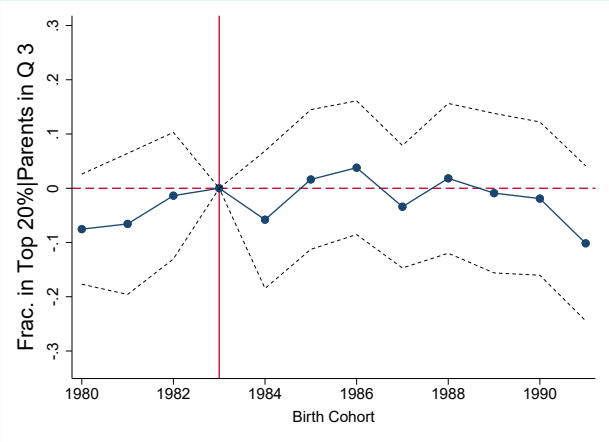
Figure A.9: **Likelihood of Top Quintile Income, Conditional on Parental Income Quintile: Ivy Plus Relative to Selective Universities (Tiers 3-5)**



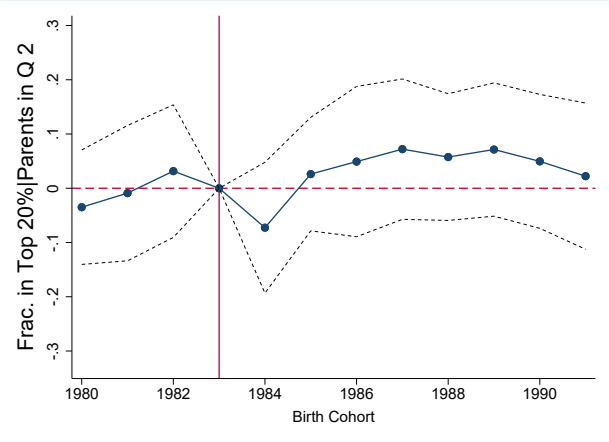
Parental Income in Quintile 5



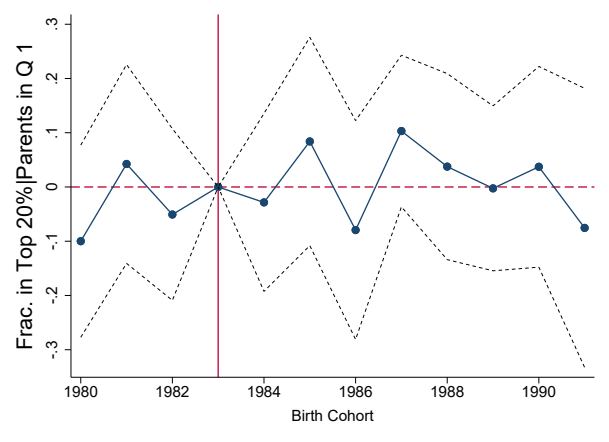
Parental Income in Quintile 4



Parental Income in Quintile 3



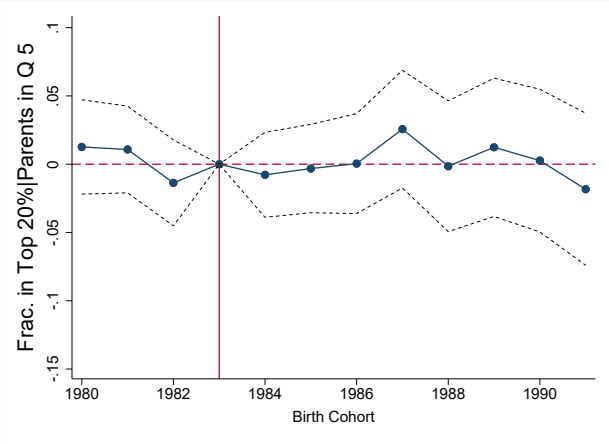
Parental Income in Quintile 2



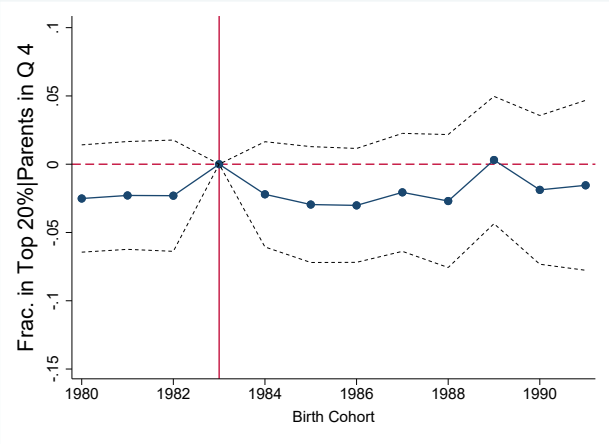
Parental Income in Quintile 1

Notes: Plots are analogous to Figure 3, but comparing Ivy Plus to Tier 3-5 universities. See Figure 3 for details.

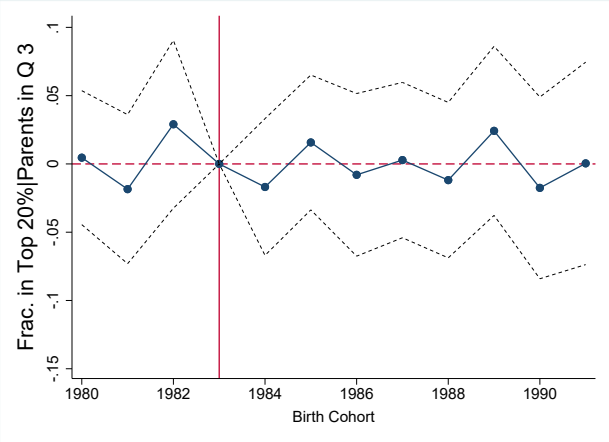
Figure A.10: **Likelihood of Top Quintile Income, Conditional on Parental Income Quintile: Highly Selective Relative to Selective Universities (Tiers 3-5)**



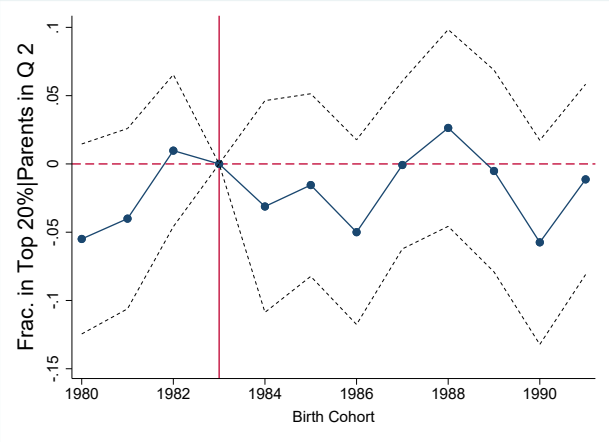
Parental Income in Quintile 5



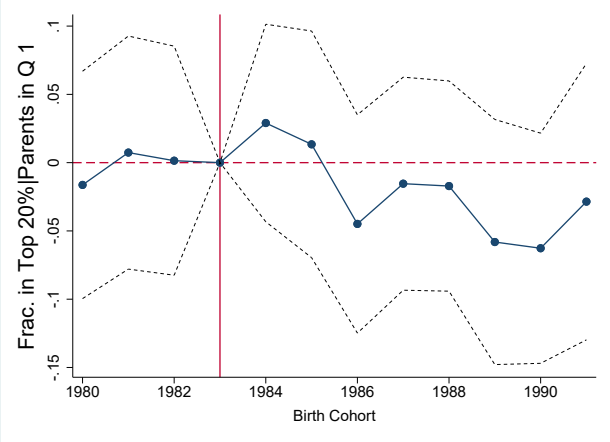
Parental Income in Quintile 4



Parental Income in Quintile 3



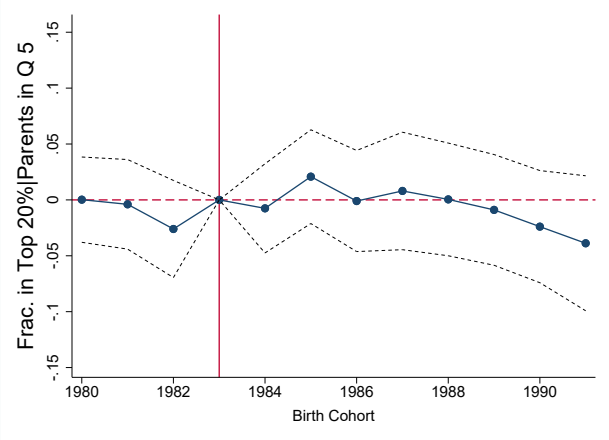
Parental Income in Quintile 2



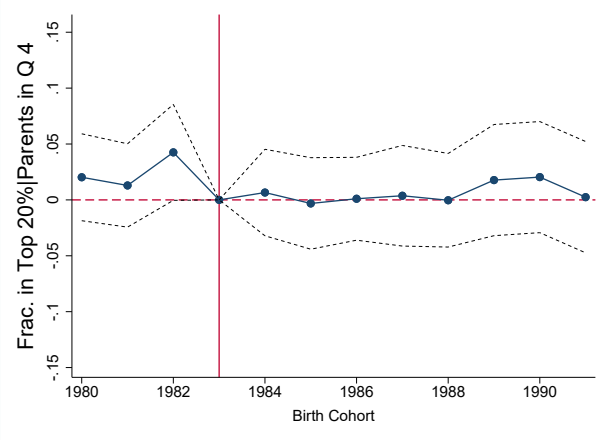
Parental Income in Quintile 1

Notes: Plots are analogous to Figure 3, but comparing Highly Selective (Tier 2) to Tier 3-5 universities. See Figure 3 for details.

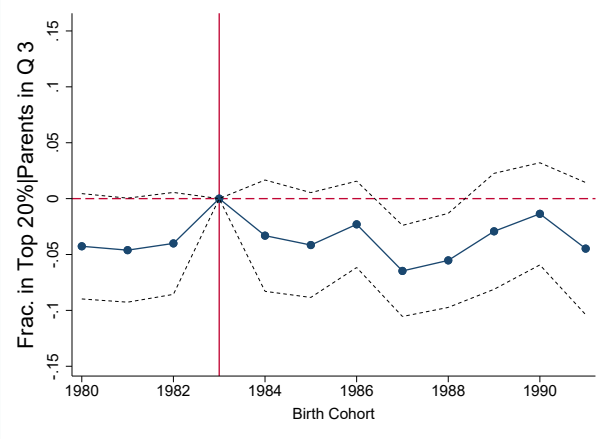
Figure A.11: **Likelihood of Top Quintile Income, Conditional on Parental Income Quintile: Nonselective Four-Year (Public/NFP) Relative to Selective Universities (Tiers 3-5)**



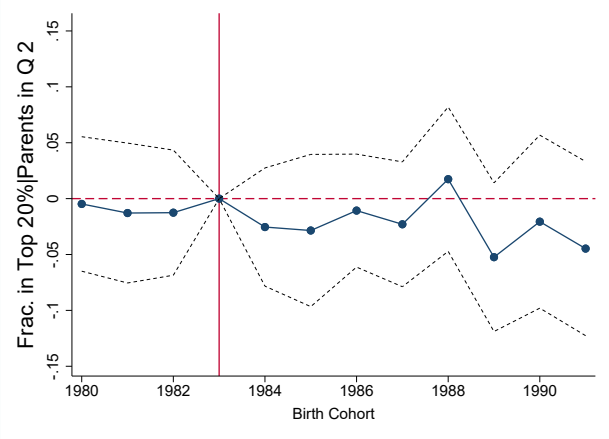
Parental Income in Quintile 5



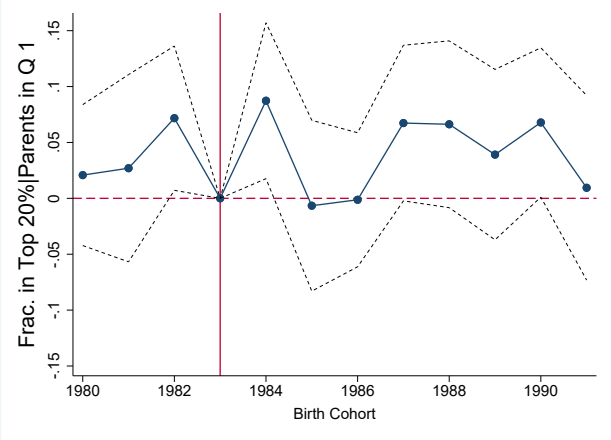
Parental Income in Quintile 4



Parental Income in Quintile 3



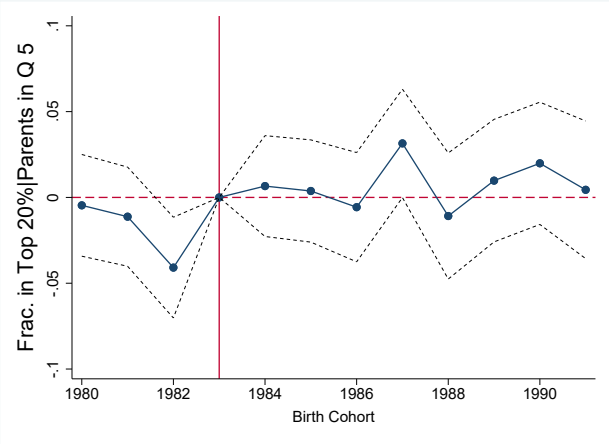
Parental Income in Quintile 2



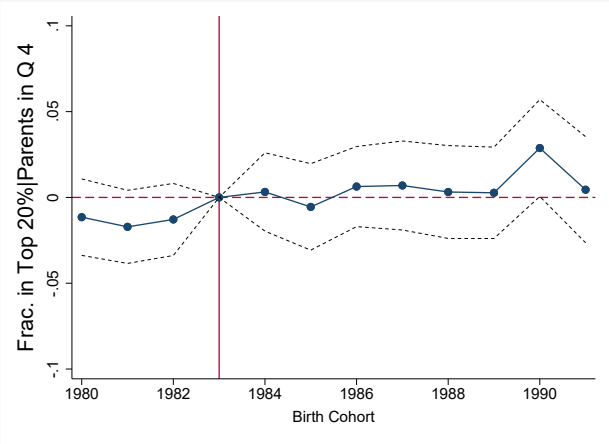
Parental Income in Quintile 1

Notes: Plots are analogous to Figure 3, but comparing nonselective four-year public and not-for-profit universities to Tier 3-5 universities. See Figure 3 for details.

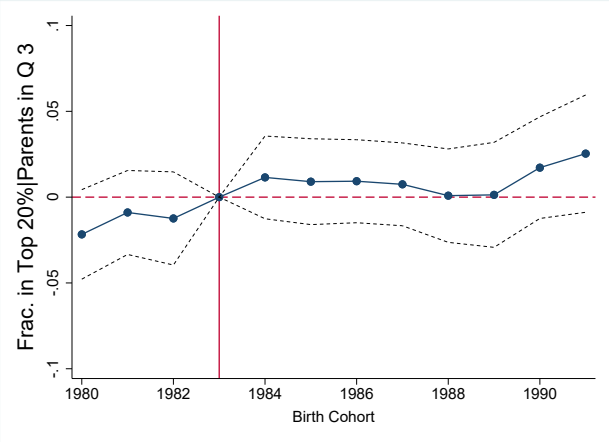
Figure A.12: **Likelihood of Top Quintile Income, Conditional on Parental Income Quintile: Two-Year (Public/NFP) Relative to Selective Universities (Tiers 3-5)**



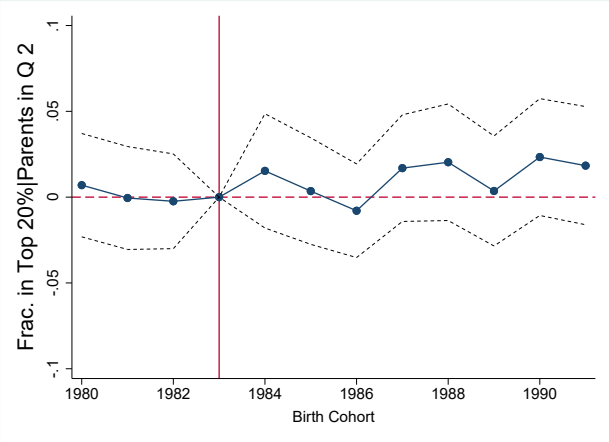
Parental Income in Quintile 5



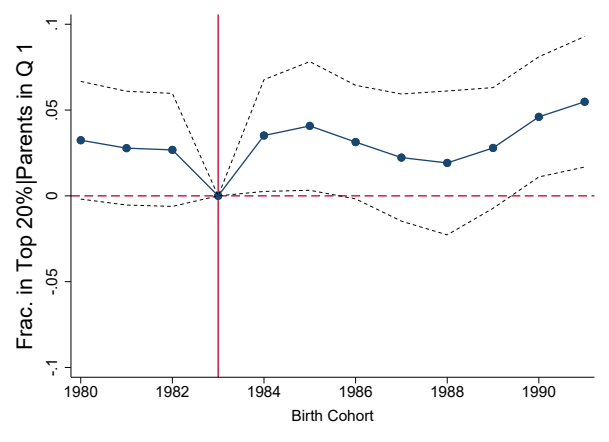
Parental Income in Quintile 4



Parental Income in Quintile 3



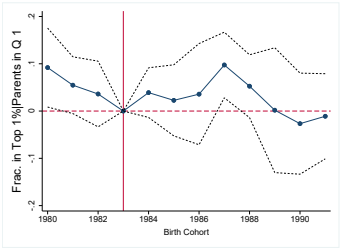
Parental Income in Quintile 2



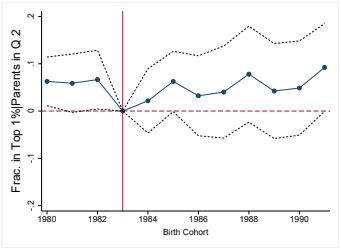
Parental Income in Quintile 1

Notes: Plots are analogous to Figure 3, but comparing two-year public and not-for-profit colleges to Tier 3-5 universities. See Figure 3 for details.

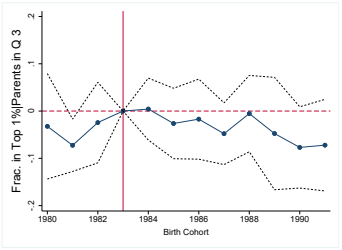
Figure A.13: **Likelihood of Top 1% Income, Conditional on Parental Income Quintile: Ivy Plus Relative to Selective Universities (Tiers 3-5)**



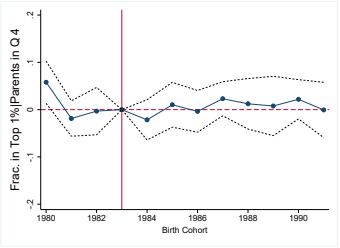
(a) Ivy Plus; Parents in Income Quintile 1



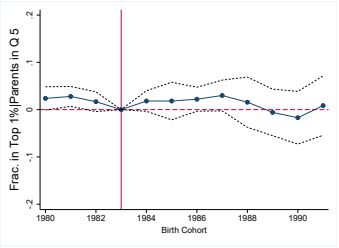
(b) Ivy Plus; Parents in Income Quintile 2



(c) Ivy Plus; Parents in Income Quintile 3



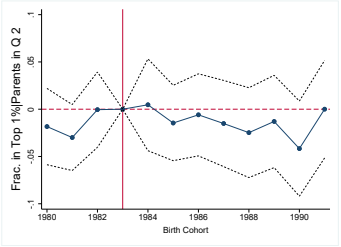
(d) Ivy Plus; Parents in Income Quintile 4



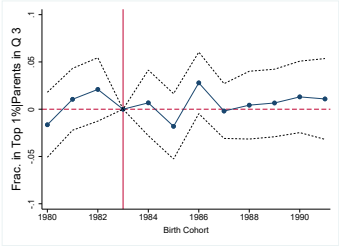
(e) Ivy Plus; Parents in Income Quintile 5

Figure A.14: **Likelihood of Top 1% Income, Conditional on Parental Income Quintile: Tier 1 (Elite) Relative to Selective Universities (Tiers 3-5)**

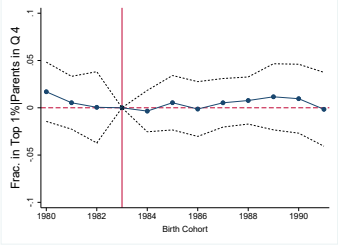
(a) Tier 1; Parents in Income Quintile 1



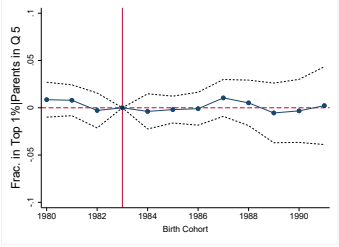
(b) Tier 1; Parents in Income Quintile 2



(c) Tier 1; Parents in Income Quintile 3



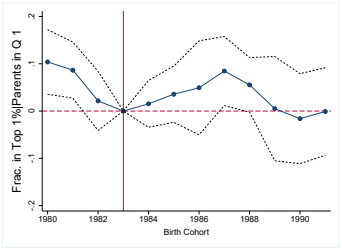
(d) Tier 1; Parents in Income Quintile 4



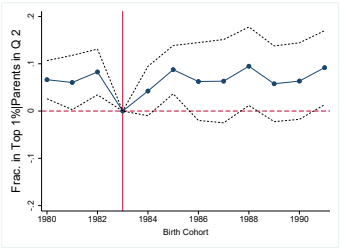
(e) Tier 1; Parents in Income Quintile 5

Notes: Plots are analogous to Figure 3, but with a different dependent variable. See Figure 3 for details.

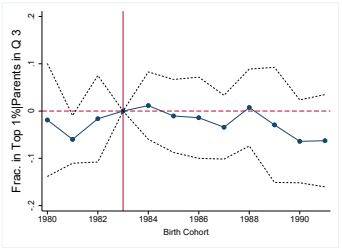
Figure A.15: **Likelihood of Top 1% Income, Conditional on Parental Income Quintile: Ivy Plus Relative to Selective Universities (Tiers 3-5), Weighted**



(a) Ivy Plus; Parents in Income Quintile 1

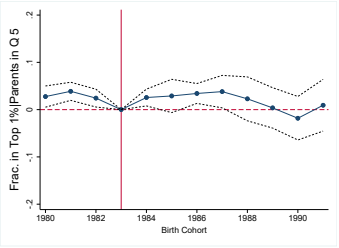


(b) Ivy Plus; Parents in Income Quintile 2



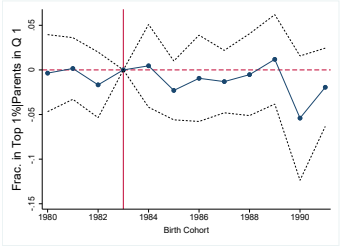
(c) Ivy Plus; Parents in Income Quintile 3

(d) Ivy Plus; Parents in Income Quintile 4

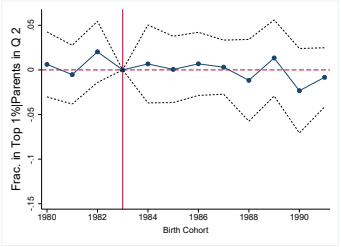


(e) Ivy Plus; Parents in Income Quintile 5

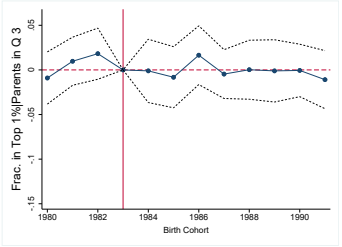
Figure A.16: **Likelihood of Top 1% Income, Conditional on Parental Income Quintile: Tier 1 (Elite) Relative to Selective Universities (Tiers 3-5), Weighted**



(a) Tier 1; Parents in Income Quintile 1

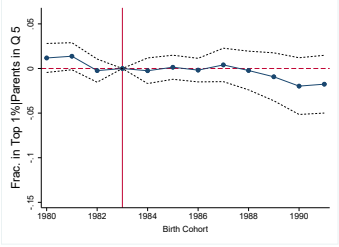


(b) Tier 1; Parents in Income Quintile 2



(c) Tier 1; Parents in Income Quintile 3

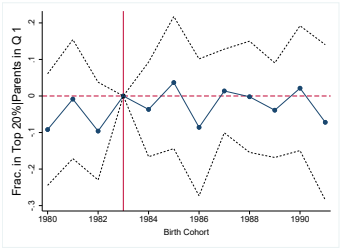
(d) Tier 1; Parents in Income Quintile 4



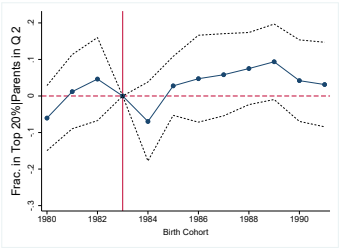
(e) Tier 1; Parents in Income Quintile 5

Notes: Plots are analogous to those in Figure A.13 and A.14, but observations are weighted by the size of the birth cohort-university-parental income quintile cell.

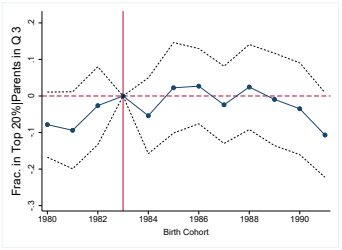
Figure A.17: **Likelihood of Top Quintile Income, Conditional on Parental Income Quintile: Ivy Plus Relative to Selective Universities (Tiers 3-5), Weighted**



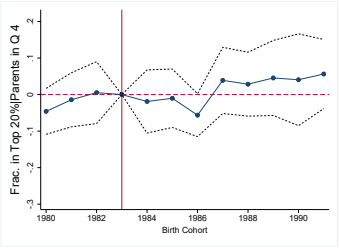
(a) Ivy Plus; Parents in Income Quintile 1



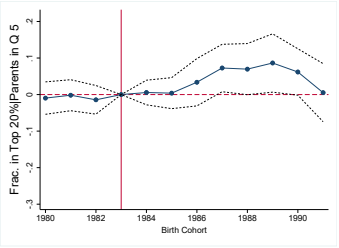
(b) Ivy Plus; Parents in Income Quintile 2



(c) Ivy Plus; Parents in Income Quintile 3



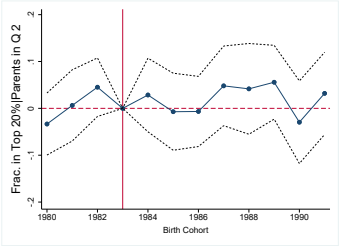
(d) Ivy Plus; Parents in Income Quintile 4



(e) Ivy Plus; Parents in Income Quintile 5

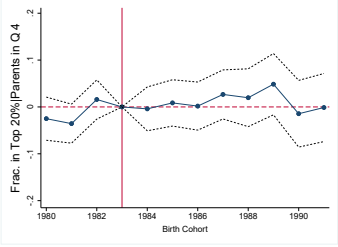
Figure A.18: **Likelihood of Top Quintile Income, Conditional on Parental Income Quintile: Tier 1 (Elite) Relative to Selective Universities (Tiers 3-5), Weighted**

(a) Tier 1; Parents in Income Quintile 1

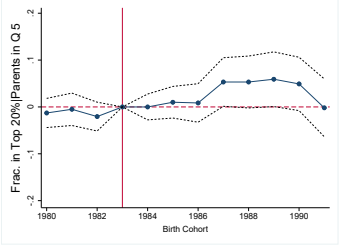


(b) Tier 1; Parents in Income Quintile 2

(c) Tier 1; Parents in Income Quintile 3



(d) Tier 1; Parents in Income Quintile 4

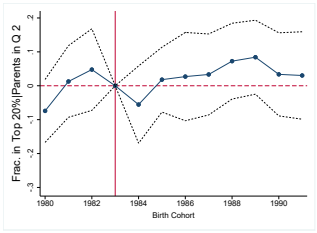


(e) Tier 1; Parents in Income Quintile 5

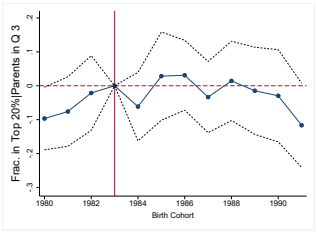
Notes: Plots are analogous to those in Figure 3 and A.9, but observations are weighted by the size of the birth cohort-university-parental income quintile cell.

Figure A.19: **Likelihood of Top Quintile Income, Conditional on Parental Income Quintile: Ivy Plus Relative to Selective Universities (Tiers 3-5), Including Interactions with Fraction Parents in Top 5 and Top 1%**

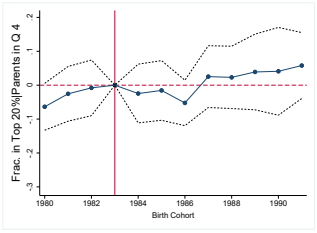
(a) Ivy Plus; Parents in Income Quintile 1



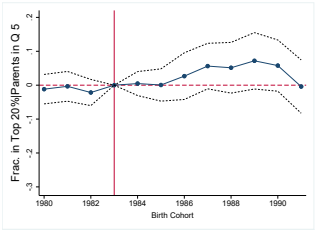
(b) Ivy Plus; Parents in Income Quintile 2



(c) Ivy Plus; Parents in Income Quintile 3



(d) Ivy Plus; Parents in Income Quintile 4



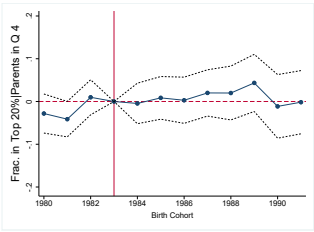
(e) Ivy Plus; Parents in Income Quintile 5

Figure A.20: **Likelihood of Top Quintile Income, Conditional on Parental Income Quintile: Tier 1 (Elite) Relative to Selective Universities (Tiers 3-5), Including Interactions with Fraction Parents in Top 5 and Top 1%**

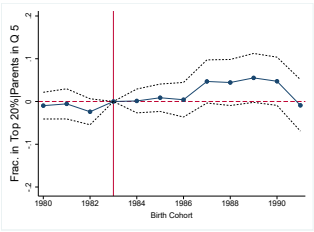
(a) Tier 1; Parents in Income Quintile 1

(b) Tier 1; Parents in Income Quintile 2

(c) Tier 1; Parents in Income Quintile 3



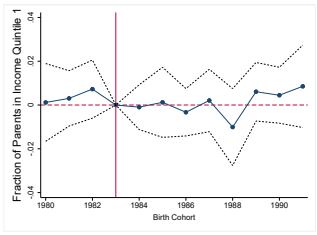
(d) Tier 1; Parents in Income Quintile 4



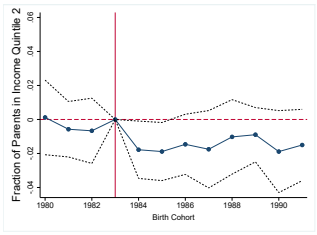
(e) Tier 1; Parents in Income Quintile 5

Notes: Plots are analogous to those in Figure 3 and A.9, but additionally include interactions between birth cohort, severe recession in the CZ, and fraction with parents in the top 5% of incomes, and separately in the top 1% of incomes.

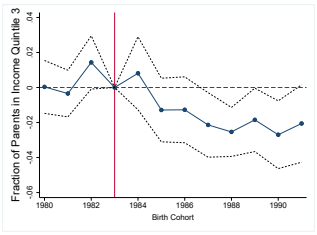
Figure A.21: **Fraction of Students with Parents in Each Income Quintile, Ivy Plus Relative to Tier 3-5 (Selective) Universities**



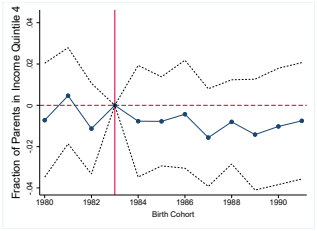
(a) Ivy Plus; Parents in Income Quintile 1



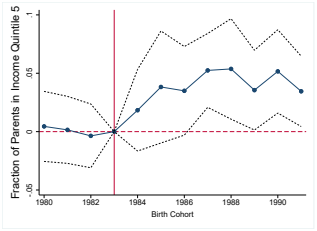
(b) Ivy Plus; Parents in Income Quintile 2



(c) Ivy Plus; Parents in Income Quintile 3

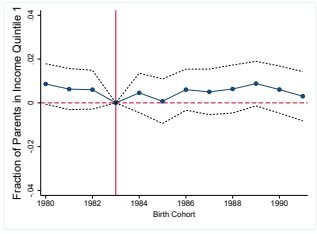


(d) Ivy Plus; Parents in Income Quintile 4

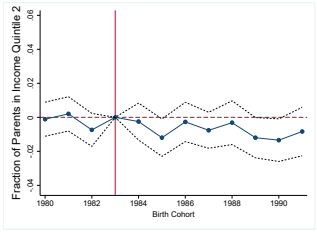


(e) Ivy Plus; Parents in Income Quintile 5

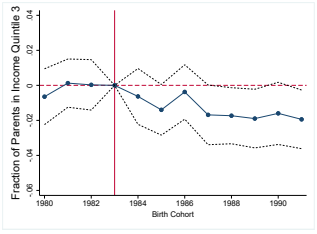
Figure A.22: **Fraction of Students with Parents in Each Income Quintile, Tier 1 Relative to Tier 3-5 (Selective) Universities**



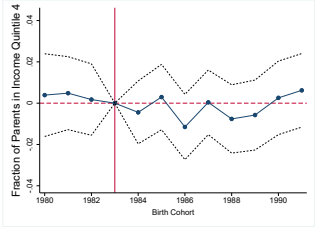
(a) Tier 1; Parents in Income Quintile 1



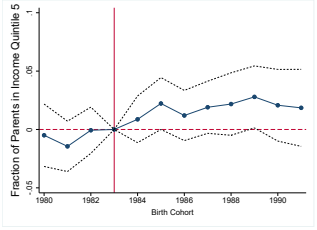
(b) Tier 1; Parents in Income Quintile 2



(c) Tier 1; Parents in Income Quintile 3



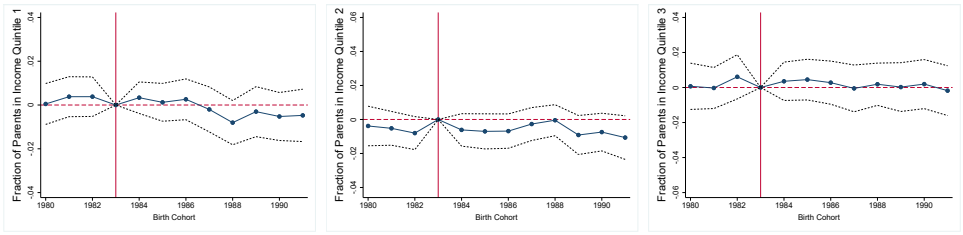
(d) Tier 1; Parents in Income Quintile 4



(e) Tier 1; Parents in Income Quintile 5

Notes: Each plot is from estimating a version of Equation (1), in which the dependent variable is the fraction of students with parents in the given income quintile. The coefficients are on the interaction between birth cohort, selectivity tier, and an indicator for severe recession in the CZ. The regression also includes birth cohort-selectivity tier fixed effects, birth cohort-CZ fixed effects, and university fixed effects, but does not include the other covariates in Equation (1). Standard errors are clustered at the university level.

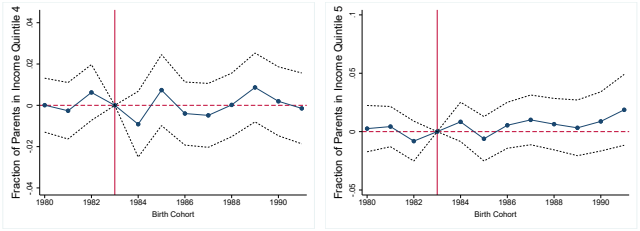
Figure A.23: **Fraction of Students with Parents in Each Income Quintile, Tier 2 Relative to Tier 3-5 (Selective) Universities**



(a) Tier 2; Parents in Income Quintile 1

(b) Tier 2; Parents in Income Quintile 2

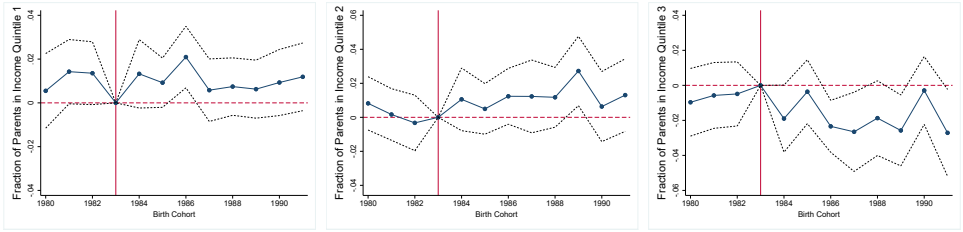
(c) Tier 2; Parents in Income Quintile 3



(d) Tier 2; Parents in Income Quintile 4

(e) Tier 2; Parents in Income Quintile 5

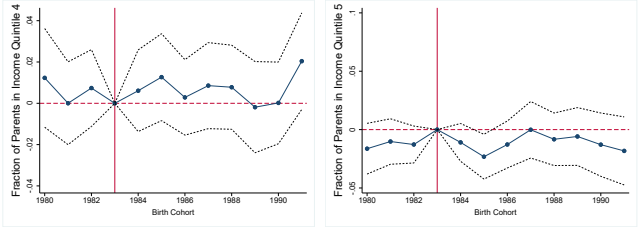
Figure A.24: **Fraction of Students with Parents in Each Income Quintile, Nonselective Relative to Tier 3-5 (Selective) Universities**



(a) Nonselective 4 Year; Parents in Income Quintile 1

(b) Nonselective 4 Year; Parents in Income Quintile 2

(c) Nonselective 4 Year; Parents in Income Quintile 3

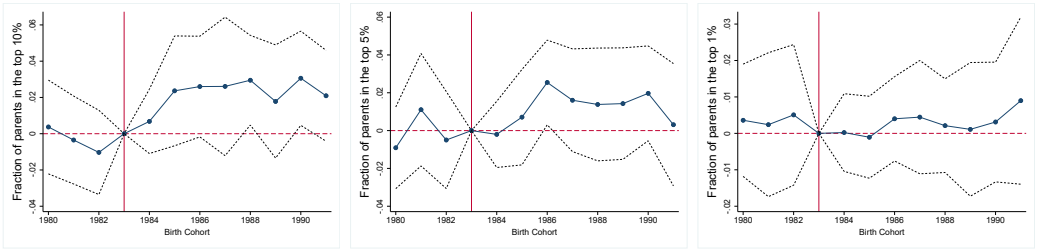


(d) Nonselective 4 Year; Parents in Income Quintile 4

(e) Nonselective 4 Year; Parents in Income Quintile 5

Notes: Plots are analogous to those in Figure A.22, but showing comparisons of Tier 3-5 universities to Tier 2 universities, and to nonselective four-year public and not-for-profit universities. See Figure A.22 and text for details.

Figure A.25: **Fraction of Students with Parents in Top Income Percentiles, Ivy Plus Relative to Tier 3-5 (Selective) Universities**

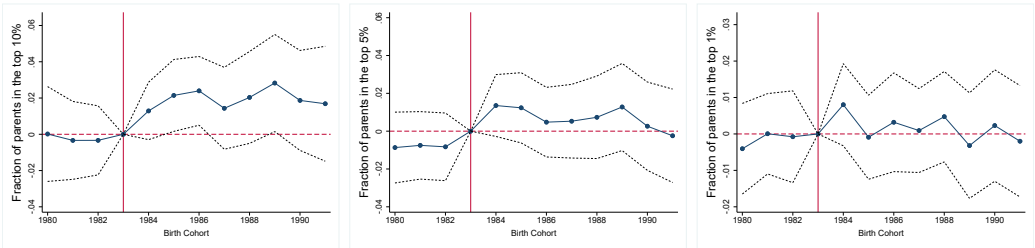


(a) Ivy Plus; Parents in Top 10%

(b) Ivy Plus; Parents in Top 5%

(c) Ivy Plus; Parents in Top 1%

Figure A.26: **Fraction of Students with Parents in Top Income Percentiles, Tier 1 Relative to Tier 3-5 (Selective) Universities**



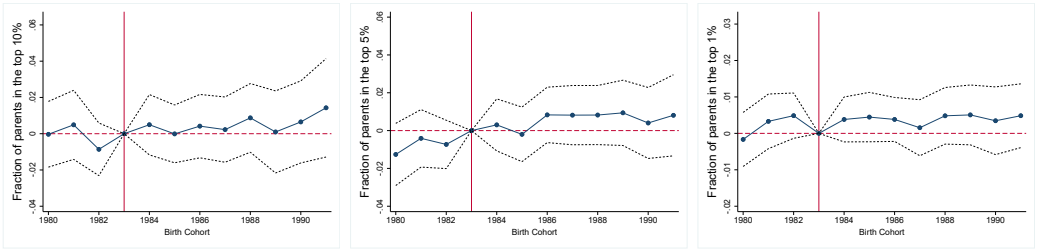
(a) Tier 1; Parents in Top 10%

(b) Tier 1; Parents in Top 5%

(c) Tier 1; Parents in Top 1%

Notes: Plots are analogous to those in Figure A.21 and A.22, but the dependent variables are the fraction of students with parents in top income percentiles. See Figures A.21 and A.22 and text for details.

Figure A.27: **Fraction of Students with Parents in Top Income Percentiles, Tier 2 Relative to Tier 3-5 (Selective) Universities**

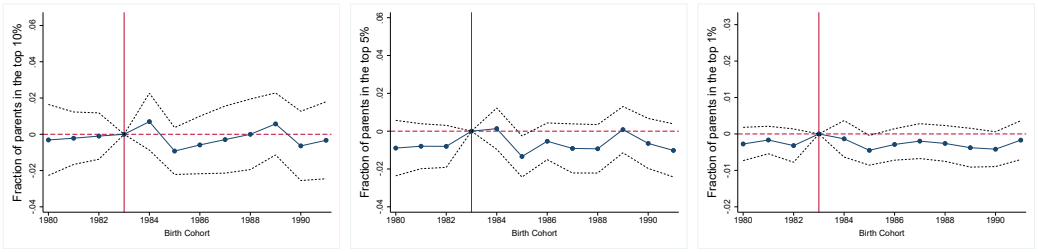


(a) Tier 2; Parents in Top 10%

(b) Tier 2; Parents in Top 5%

(c) Tier 2; Parents in Top 1%

Figure A.28: **Fraction of Students with Parents in Top Income Percentiles, Nonselective Relative to Tier 3-5 (Selective) Universities**



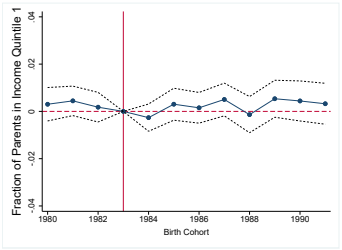
(a) Nonselective 4 Year; Parents in Top 10%

(b) Nonselective 4 Year; Parents in Top 5%

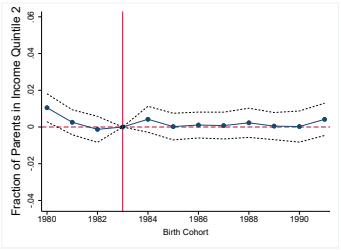
(c) Nonselective 4 Year; Parents in Top 1%

Notes: Plots are analogous to those in Figure A.23 and A.24, but the dependent variables are the fraction of students with parents in top income percentiles. See Figures A.23 and A.24 and text for details.

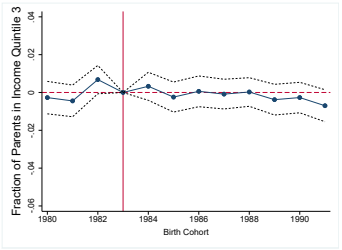
Figure A.29: **Fraction of Students with Parents in Each Income Quintile, Two-Year Relative to Tier 3-5 (Selective) Universities**



(a) Two Year; Parents in Income Quintile 1

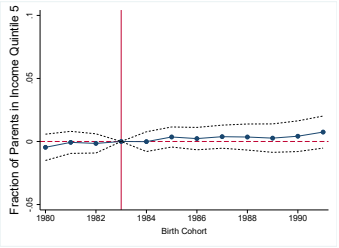


(b) Two Year; Parents in Income Quintile 2



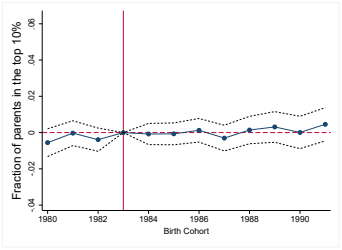
(c) Two Year; Parents in Income Quintile 3

(d) Two Year; Parents in Income Quintile 4

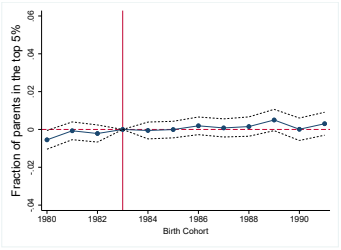


(e) Two Year; Parents in Income Quintile 5

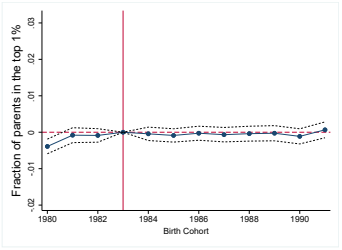
Figure A.30: **Fraction of Students with Parents in Top Income Percentiles, Two-Year Relative to Tier 3-5 (Selective) Universities**



(a) Two Year; Parents in Top 10%



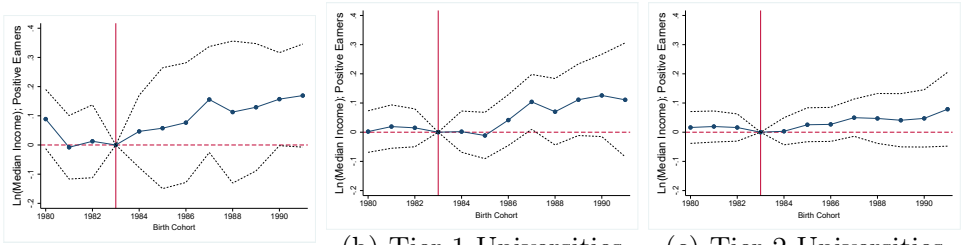
(b) Two Year; Parents in Top 5%



(c) Two Year; Parents in Top 1%

Notes: Plots are analogous to those in Figures A.21 and A.25, but showing comparisons between Tier 3-5 universities and two-year public and not-for-profit colleges. See Figures A.21 and A.25, and text for details.

Figure A.31: **Recession Effects by University Selectivity, Relative to Tier 3-5 (Selective) Universities, Males**



(a) Ivy Plus Universities

(b) Tier 1 Universities (Elite)

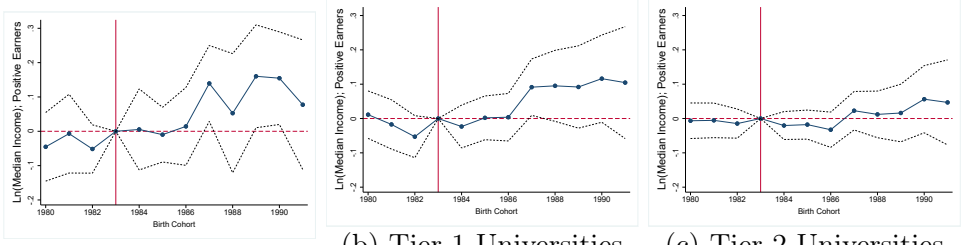
(c) Tier 2 Universities (Highly Selective)

(d) Nonselective Four-Year Univ. (Public/NFP)

(e) Two-Year Colleges (Public/NFP)

Notes: Plots are analogous to those in Figure 1, but the dependent variable is specific to males. The explanatory variables are specific to males. For example, instead of the proportion of students with parents in the first quintile as an explanatory variable, we include the proportion of males with parents in the first quintile. One exception is that we include ln(students in cohort), in addition to ln(males in cohort). See text and Figure 1 for details.

Figure A.32: **Recession Effects by University Selectivity, Relative to Tier 3-5 (Selective) Universities, Females**



(a) Ivy Plus Universities

(b) Tier 1 Universities (Elite)

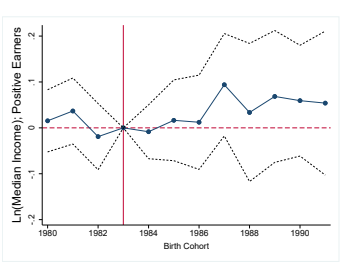
(c) Tier 2 Universities (Highly Selective)

(d) Nonselective Four-Year Univ. (Public/NFP)

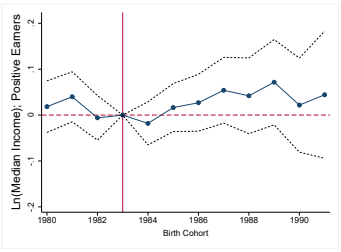
(e) Two-Year Colleges (Public/NFP)

Notes: Plots are analogous to those in Figure A.31, but for females.

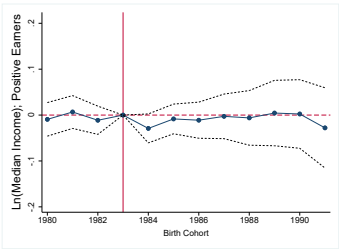
Figure A.33: **Recession Effects by University Selectivity, Relative to Tier 3-5 (Selective) Universities: State-Cohort Fixed Effects**



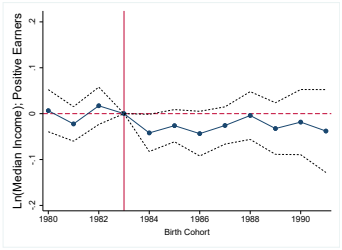
(a) Ivy Plus Universities



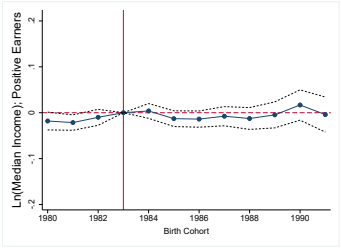
(b) Tier 1 Universities (Elite)



(c) Tier 2 Universities (Highly Selective)



(d) Nonselective Four-Year Univ. (Public/NFP)



(e) Two-Year Colleges (Public/NFP)

Notes: Plots are from the same regression, equation (1), and show coefficients on the interaction between birth cohort fixed effects, university tier, and an indicator for severe recession in the state from 2007 to 2009. Dashed lines show 95% confidence intervals. Plots are analogous to Figure 1, except these use an indicator for severe recession in the state instead of CZ, and with state-cohort FE not CZ-cohort FE. See text and notes to Figure 1 for details.

Table A.5: **Additional Specifications, Effects Relative to Tier 3-5 Universities**

	Ln(Median Income, Positive Earners)				Ln(Students)	Share Female
1980*Ivy Plus	-0.002	-0.011	0.011	-0.026	0.049	-0.015
	(0.042)	(0.043)	(0.045)	(0.037)	(0.085)	(0.020)
1980*Elite	0.020	0.012	0.025	0.023	0.088	-0.015
	(0.031)	(0.033)	(0.035)	(0.029)	(0.061)	(0.017)
1981*Ivy Plus	-0.016	0.003	0.009	-0.014	0.034	-0.023
	(0.042)	(0.047)	(0.045)	(0.040)	(0.072)	(0.018)
1981*Elite	0.007	0.016	0.019	0.010	0.036	-0.015
	(0.029)	(0.032)	(0.032)	(0.030)	(0.060)	(0.016)
1982*Ivy Plus	-0.047	-0.066	-0.061	-0.053	0.034	0.002
	(0.041)	(0.043)	(0.044)	(0.041)	(0.063)	(0.021)
1982*Elite	-0.010	-0.025	-0.022	-0.011	0.030	-0.008
	(0.027)	(0.028)	(0.029)	(0.026)	(0.043)	(0.016)
1984*Ivy Plus	0.001	-0.020	-0.013	0.008	0.059	0.012
	(0.033)	(0.036)	(0.036)	(0.036)	(0.051)	(0.015)
1984*Elite	-0.009	-0.024	-0.020	0.002	-0.025	0.004
	(0.027)	(0.027)	(0.028)	(0.029)	(0.040)	(0.014)
1985*Ivy Plus	-0.005	0.014	0.007	0.004	0.033	0.004
	(0.055)	(0.049)	(0.049)	(0.059)	(0.065)	(0.016)
1985*Elite	-0.004	0.005	0.001	0.006	-0.025	-0.009
	(0.031)	(0.031)	(0.031)	(0.031)	(0.048)	(0.014)
1986*Ivy Plus	0.023	0.032	0.039	0.024	-0.025	0.001
	(0.065)	(0.059)	(0.061)	(0.064)	(0.060)	(0.024)
1986*Elite	0.028	0.032	0.038	0.031	-0.052	0.020
	(0.035)	(0.035)	(0.036)	(0.036)	(0.049)	(0.015)
1987*Ivy Plus	0.118*	0.121*	0.123*	0.118*	0.004	-0.004
	(0.067)	(0.064)	(0.064)	(0.068)	(0.071)	(0.021)
1987*Elite	0.098**	0.097**	0.100**	0.103**	-0.068	0.005
	(0.041)	(0.040)	(0.041)	(0.045)	(0.055)	(0.015)
1988*Ivy Plus	0.082	0.089	0.084	0.066	0.005	-0.012
	(0.098)	(0.084)	(0.086)	(0.101)	(0.075)	(0.023)
1988*Elite	0.088*	0.087*	0.086*	0.081	-0.046	-0.002
	(0.050)	(0.047)	(0.049)	(0.052)	(0.062)	(0.016)
1989*Ivy Plus	0.131	0.119	0.123	0.136	0.046	-0.002
	(0.087)	(0.074)	(0.077)	(0.092)	(0.078)	(0.025)
1989*Elite	0.101*	0.087*	0.091	0.111*	-0.035	0.006
	(0.058)	(0.053)	(0.056)	(0.062)	(0.069)	(0.018)
1990*Ivy Plus	0.146**	0.138**	0.133**	0.146**	0.067	-0.012
	(0.066)	(0.058)	(0.061)	(0.072)	(0.078)	(0.023)
1990*Elite	0.132**	0.114*	0.115*	0.140**	-0.059	-0.010
	(0.064)	(0.058)	(0.062)	(0.068)	(0.070)	(0.020)
1991*Ivy Plus	0.092	0.032	0.047	0.129	0.045	-0.022
	(0.081)	(0.075)	(0.078)	(0.092)	(0.093)	(0.027)
1991*Elite	0.112	0.064	0.075	0.139	-0.099	0.005
	(0.085)	(0.078)	(0.082)	(0.090)	(0.084)	(0.020)
N	14,652	14,616	14,616	14,652	14,652	14,652
R-Squared	0.982	0.983	0.982	0.982	0.989	0.960
Interactions with Majors	N	All	Top 3	N	N	N
Interactions with Fract. Parents in Top 5 and Top 1%	N	N	N	Y	N	N

Notes: *** p-value $\leq$ .01, ** p-value $\leq$ .05, * p-value $\leq$ .1. Coefficients are on birth cohort, university tier, *SevereShock* interactions in equation (1) with different dependent variables. Column 1 presents the results from Figure 1. Columns 2 and 3 additionally include interactions between birth cohort, indicator for severe recession, and share in major category in 2000 based on the eight classifications of college majors in Chetty et al. (2020), as well as lower level terms. Column 2 includes interactions with all major categories, while column 3 shows interactions with the three categories that have the largest average share at Tier 3-5 universities. Column 4 shows interactions between birth cohort, indicator for severe recession, and fraction with parents in the top 5% of incomes and separately with fraction in top 1% of incomes. I do not show interactions with all tiers for space constraints. See Figure 1 and text for details.

Table A.6: Differential 2001-2013 Change in Average SAT scores in Severely-Affected CZs, by University Selectivity, Relative to Tier 3-5 Universities

Y = Change in Average SAT 2001-2013		
Ivy Plus*Severe Recession	51.421*	52.399***
	(31.049)	(20.180)
Tier 1* Severe Recession	-12.266	-5.735
	(18.043)	(17.630)
Tier 2*Severe Recession	-14.899	-30.152
	(23.926)	(24.088)
Interactions between Tier and Change in Parental Income	N	Y
Number of Observations	401	401
R-squared	0.383	0.514

Notes: *** p-value $\leq$ .01, ** p-value $\leq$ .05, * p-value $\leq$ .1. There is one observation per university in the regression. Robust standard errors in parentheses. The regression also includes CZ fixed effects, and university tier fixed effects. The omitted interaction is between Tier 3-5 and Severe Recession. Data on average SAT scores are from the mobility report cards, for 2001 and 2013. These data are not available for universities that do not require SAT scores. We have data for 10 of the 12 Ivy Plus universities, 50 of the 59 Tier 1 universities, 51 of the 73 Tier 2 universities, 368 of the 611 Tier 3-5 universities, 12 of the 79 nonselective four-year not-for-profit and public universities, and zero of the 387 two-year public and not-for-profit colleges. While I include interactions between the nonselective tier and Severe Recession, I do not show the coefficients given the small number of these universities for which we have the data. The second column includes interactions between university selectivity tier fixed effects and the following variables: change in the fraction of students with parents in the second income quintile, the third, fourth, and fifth, and change in the fraction of students with parents in the top 10% of incomes. These changes are measured between the 1983 birth cohort and 1991 birth cohort, to approximate as best as possible given the data constraints, the period over which we are measuring the change in SAT scores.

Table A.7: **Changes in Recruiting Over Time, within Firm-University Pairs**

Y = Recruit	1	2	3	4	5	6	7	8
2000	-0.026***	-0.153***	-0.038***	-0.023*	-0.008	-0.012	-0.014***	-0.022**
	(0.009)	(0.041)	(0.014)	(0.012)	(0.007)	(0.016)	(0.005)	(0.008)
2001	-0.020***	-0.134***	-0.027***	-0.014	-0.008	-0.012	-0.010***	-0.026***
	(0.007)	(0.035)	(0.010)	(0.011)	(0.007)	(0.013)	(0.004)	(0.008)
2002	-0.021***	-0.091**	-0.026**	-0.017	-0.013**	-0.009	-0.011***	-0.024***
	(0.008)	(0.038)	(0.012)	(0.011)	(0.006)	(0.014)	(0.004)	(0.008)
2003	-0.025***	-0.110***	-0.032***	-0.022**	-0.014***	-0.022***	-0.013***	-0.025***
	(0.006)	(0.028)	(0.008)	(0.008)	(0.005)	(0.008)	(0.003)	(0.007)
2004	-0.024***	-0.093***	-0.030***	-0.025***	-0.013**	-0.020**	-0.012***	-0.025***
	(0.007)	(0.029)	(0.011)	(0.008)	(0.005)	(0.008)	(0.004)	(0.007)
2005	-0.015**	-0.010	-0.021**	-0.019**	-0.011**	-0.011	-0.008**	-0.017***
	(0.006)	(0.024)	(0.009)	(0.007)	(0.004)	(0.008)	(0.003)	(0.005)
2006	-0.017**	-0.033	-0.022*	-0.020***	-0.012***	-0.021*	-0.009***	-0.015**
	(0.007)	(0.030)	(0.012)	(0.007)	(0.004)	(0.011)	(0.003)	(0.006)
2008	-0.014***	-0.047**	-0.019***	-0.012**	-0.009**	-0.010*	-0.008***	-0.016**
	(0.005)	(0.020)	(0.007)	(0.006)	(0.004)	(0.005)	(0.003)	(0.006)
2009	-0.022***	-0.077***	-0.028***	-0.025***	-0.013***	-0.020***	-0.012***	-0.019**
	(0.005)	(0.019)	(0.008)	(0.008)	(0.004)	(0.007)	(0.003)	(0.008)
2010	-0.017**	-0.041	-0.023*	-0.017*	-0.011*	-0.018	-0.009**	-0.015*
	(0.008)	(0.029)	(0.012)	(0.010)	(0.006)	(0.011)	(0.004)	(0.008)
2011	-0.012**	-0.037	-0.020**	-0.013*	-0.004	-0.012	-0.006*	-0.014*
	(0.006)	(0.026)	(0.009)	(0.008)	(0.005)	(0.007)	(0.003)	(0.008)
2012	-0.013**	-0.041	-0.020**	-0.014*	-0.005	-0.012*	-0.007*	-0.013**
	(0.006)	(0.026)	(0.008)	(0.008)	(0.006)	(0.007)	(0.003)	(0.006)
2013	-0.013**	-0.060***	-0.014	-0.012	-0.008	-0.010	-0.007**	-0.006
	(0.006)	(0.019)	(0.009)	(0.007)	(0.005)	(0.007)	(0.003)	(0.006)
Tier	All	Ivy Plus	Elite	Highly Selective	Selective	All	All	All
Balance	2007	2007	2007	2007	2007	2007, 2009, 2013	2007	2007
N	131,671	6,399	32,329	32,332	59,468	68,482	253,562	229,317
DV Mean, 2007	.057	.245	.072	.059	.029	.031	.030	.044
R-squared	0.567	0.650	0.559	0.565	0.438	0.550	0.574	0.386
Test 2009 = 2013						0.083		

Notes: *** p-value $\leq$ .01, ** p-value $\leq$ .05, * p-value $\leq$ .1. This table shows coefficients corresponding to Figures 4a and A.34. Dependent variable is an indicator for whether firm f recruits at university j in year t. All regressions include firm-university pair fixed effects. Standard errors are clustered at the firm and university level (except in column 2 where they are clustered only at the firm level due to a small number of universities). The regression includes only firm-university pairs with data in 2007, and except in column 7 only firms that recruit on at least one campus in the data throughout the sample period, and universities that attract at least one firm in the data throughout the sample period. Column 6 includes only firm-university pairs with data in 2007, 2009, and 2013. Column 8 uses a version of *Recruit* set to zero instead of missing if the recruiting page is nonarchived for reasons other than being blocked to robots or nonworking links. See text for details.

Figure A.34: **Changes in Recruiting Over Time, within Firm-University Pairs, Balance in 2007, 2009, 2013**

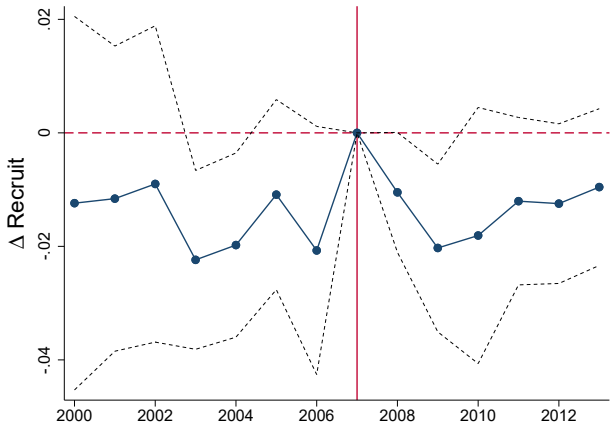
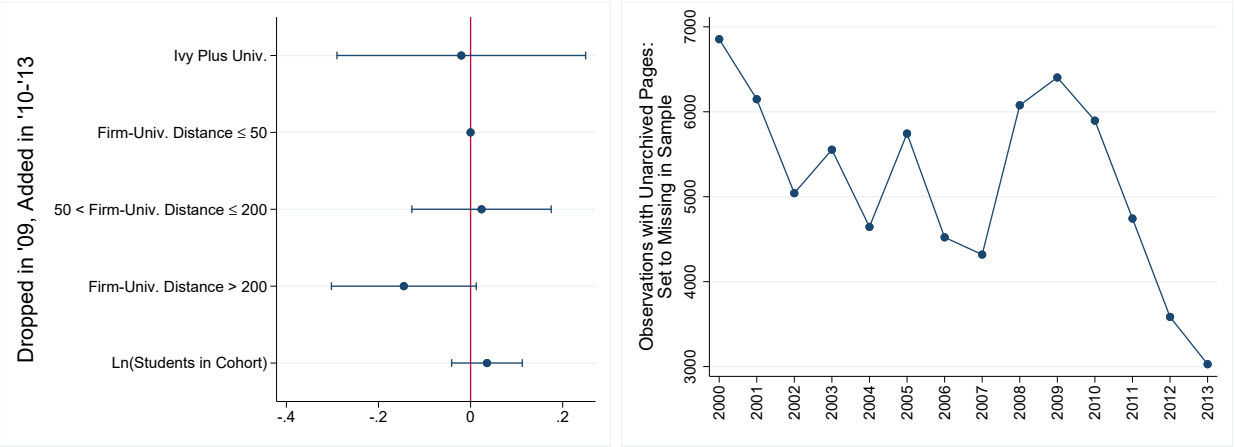


Figure A.35:



(a) **Campuses Added Back in 2010-2013** (b) **Observations with Unarchived Pages**

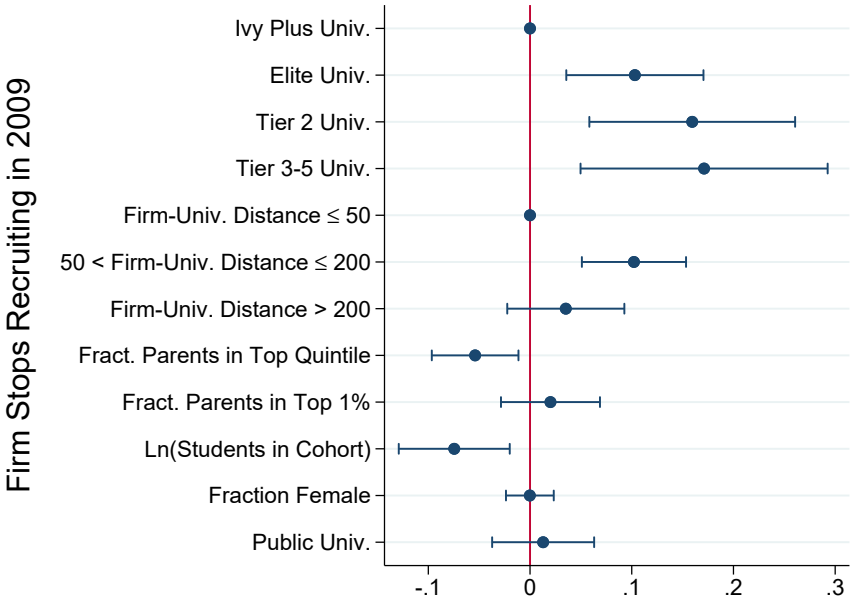
Notes: Figure A.34 is the same as Figure 4a, but includes only pairs with data in 2007, 2009, and 2013. For plot A.35a, the dependent variable is an indicator for whether the firm was recruiting on campus in 2010 or 2011 or 2012 or 2013, after not recruiting on campus in 2009, but recruiting in 2007. The sample includes all firm-university pairs for which $Recruit = 1$ in 2007 and $Recruit = 0$ in 2009. The regression also includes firm fixed effects. Coefficients on Ivy Plus universities are relative to other university tiers. Standard errors are clustered at the firm and university level. Plot A.35b shows the number of firm-university pairs with *Recruit* equal to missing in the main sample, for reasons other than the website being blocked to robots or having nonworking links. In Table A.7 column 8 these are set to zero as this may reflect lack of recruiting. I include in the sum in this figure only firm-university pairs that would be in the regression sample. Specifically, I include those for which the firm recruited at least once during the sample, and the university attracted at least one firm during the sample, and the firm-university pair had data based on this alternative measure in 2007.

Table A.8: **Losing and Regaining Access to Firms**

Dependent Variable	Dropped	Dropped or Missing	Return by 2011	Return by 2013	Return by 2011 Excl. if Miss Return	Return by 2013 Excl. if Miss Return
Ivy Plus			0.108**	-0.020	0.112	-0.052
			(0.048)	(0.131)	(0.068)	(0.105)
Tier 1 (Elite)	0.137**	0.103***				
	(0.052)	(0.033)				
Tier 2 (Highly Selective)	0.267***	0.159***				
	(0.064)	(0.050)				
Tier 3-5 (Selective)	0.285***	0.171***				
	(0.090)	(0.060)				
Firm-Univ. Distance $\in$ 50-200 Miles	0.121***	0.102***	-0.036	0.024	-0.056	0.038
	(0.030)	(0.025)	(0.036)	(0.073)	(0.068)	(0.080)
Firm-Univ. Dist. $>$ 200 Miles	0.044	0.035	-0.153***	-0.145*	-0.185***	-0.165*
	(0.048)	(0.029)	(0.054)	(0.076)	(0.069)	(0.090)
Fract. Parents in Top Income Quintile	-0.086**	-0.054**				
	(0.038)	(0.021)				
Fract. Parents in Top 1% of Income Dist.	0.017	0.020				
	(0.036)	(0.024)				
Ln(Students in Cohort)	-0.123***	-0.074***	0.025	0.036	0.020	0.026
	(0.040)	(0.027)	(0.027)	(0.037)	(0.033)	(0.042)
Fraction Female	-0.005	-0.000				
	(0.020)	(0.012)				
Public Univ.	-0.046	0.013				
	(0.043)	(0.025)				
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	435	733	237	237	172	204
R-squared	0.527	0.579	0.440	0.397	0.483	0.403

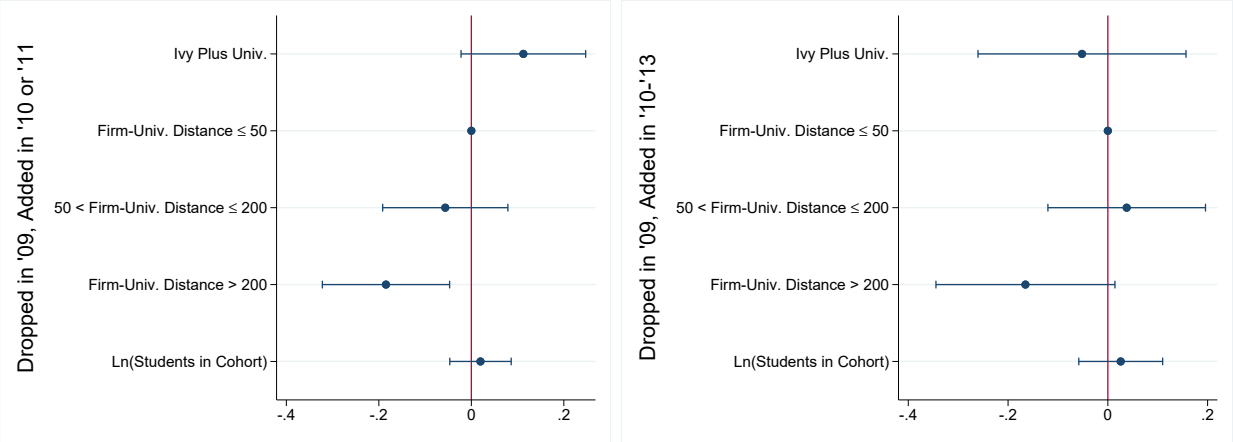
Notes: *** p-value $\leq$ .01, ** p-value $\leq$ .05, * p-value $\leq$ .1. Dependent variable in column 1 is an indicator for whether the firm was not recruiting on campus in 2009, but had recruited in 2007. In column 2, the dependent variable is an indicator for whether the firm was not recruiting on campus in 2009 or the recruiting variable was missing, but had recruited in 2007. Columns 1 and 2 include all firm-university pairs for which $Recruit = 1$ in 2007, and standard errors are clustered at the firm and university level. In columns 3 and 4, the dependent variable is an indicator for whether the firm was recruiting on campus in 2010 or 2011 (column 3), or 2010 or 2011 or 2012 or 2013 (column 4), after not recruiting on campus in 2009, but recruiting in 2007. The sample includes all firm-university pairs for which $Recruit = 1$ in 2007 and $Recruit = 0$ in 2009. Standard errors are clustered at the firm and university level. Columns 5 and 6 are the same as 3 and 4, but they exclude observations if $Return$ is missing due to missing recruiting variables. Standard errors are clustered at the university level. All regressions include firm fixed effects. The following variables are standardized so they are mean zero and standard deviation one in the regression sample: fraction with parents in the top income quintile, fraction with parents in the top 1% of the income distribution, and fraction of the university cohort that is female. Standard errors are clustered at the firm and university level. We exclude universities for which the reporting of mobility report card variables is for multiple universities in a university system. We use covariate values corresponding to the 1985 birth cohort. See text for details.

Figure A.36: **Dropped Target Campuses in 2009, by University Characteristics, Treating Missing Recruiting as Dropped**



Notes: Plot shows coefficients on university characteristics, when the dependent variable is an indicator for whether the firm was not recruiting on campus in 2009 (recruiting was either coded as zero or missing), but had recruited in 2007. The sample includes all firm-university pairs for which *Recruit* = 1 in 2007. Standard errors clustered at the firm and university level. See text and notes to Figure 4b for details.

Figure A.37: **Campuses Added Back After Being Dropped in 2009, Setting Return to Missing if Recruit is Missing**



(a) Added Back 2010 or 2011 (b) Added Back 2010-2013

Notes: Plot shows coefficients on university characteristics, when the dependent variable is an indicator for whether the firm was recruiting on campus in 2010 or 2011 (A.37a), or 2010 or 2011 or 2012 or 2013 (A.37b), after not recruiting on campus in 2009, but recruiting in 2007. The sample includes all firm-university pairs for which *Recruit* = 1 in 2007 and *Recruit* = 0 in 2009. This differs from Figure 4c and Figure A.35a because *Return* is set to missing here if *Recruit* is missing. The number of firms in these regressions falls to 22 and 23, and for the coefficient on Ivy Plus in Equation (3), the two-way clustered standard errors are smaller than those clustered at the university level. Thus, for Figure A.37 standard errors are clustered at the university level. See text and Figures 4c and A.35a for details.

Table A.9: **Firms in Recruiting Sample (Equation (2)), by Year**

Firm	Years in Sample
Banks	
ABN AMRO	2000-2007
Bank of America	2005-2007, 2012-2013
BNP Paribas	2001-2002, 2006-2007, 2013
Citi	2000-2009
Gleacher & Company	2000-2013
Houlihan Lokey	2000-2004, 2007, 2009-2013
HSBC	2004-2013
Jefferies & Company	2000-2013
JP Morgan Chase & Co.	2000, 2003, 2006-2007
Lazard	2000-2010
Macquarie Group	2000-2004, 2006-2009
Morgan Stanley	2001-2002, 2005-2009, 2011-2013
Perella Weinberg Partners	2006-2009, 2012-2013
Piper Jaffray Companies	2000-2005, 2007, 2010, 2012-2013
Raymond James Financial	2000-2002, 2004-2010, 2012-2013
Robert W. Baird & Co.	2007-2011
Rothschild	2002-2003, 2005-2008, 2011-2013
Thomas Wiesel Partners Group	2000, 2007-2009
U.S. Bancorp	2002-2004, 2006-2013
Wachovia	2000-2008
Consulting Firms	
A. T. Kearney	2004-2013
Analysis Group	2006-2013
Arthur D. Little	2003-2008, 2010, 2012-2013
Bain & Company	2000-2007, 2011-2012
BearingPoint	2007-2008
Booz Allen Hamilton	2000, 2006-2009, 2011-2013
Corporate Executive Board	2000-2008, 2010
Dean & Company	2000-2011
First Manhattan Consulting Group	2000-2008, 2010-2012
FTI Consulting	2000, 2004-2007, 2009, 2012-2013
Gallup	2000-2003, 2005, 2007-2013
Hewitt Associates	2000-2013

Continued on next page

Table A.9 – continued from previous page

Firm	Years in Sample
Huron Consulting Group	2002-2013
Kurt Salmon	2000, 2005-2011
Marakon	2000-2001, 2003-2013
McKinsey & Company	2007-2013
Mercer	2004, 2006-2011, 2013
Mitchell Madison Group	2003-2013
Navigant	2005-2010, 2012-2013
NERA Economic Consulting	2000, 2003, 2005-2013
OC&C Strategy Consultants	2004-2007, 2011-2013
Oliver Wyman	2001-2013
PA Consulting Group	2003-2005, 2007, 2009-2013
PRTM	2000-2010
Putnam Associates	2000-2009, 2011-2012
Roland Berger	2001-2002, 2006-2009, 2011-2013
The Boston Consulting Group	2001-2007, 2009-2013
ZS Associates	2000-2005, 2007-2012
Fortune 250 Firms	
ConAgra Foods	2002-2004, 2006-2008, 2010-2013
ConocoPhillips	2000-2002, 2004-2013
Eli Lilly	2001-2003, 2005-2013
General Electric	2000-2013
General Mills	2002-2010, 2012-2013
Goodyear Tire & Rubber	2001-2013
Halliburton	2004-2005, 2007-2013
Honeywell International	2000-2004, 2007-2008, 2010-2013
KBR	2004, 2007-2013
Kohl's	2002-2007, 2009-2012
Lowe's	2002-2008, 2010-2011
McKesson	2000-2002, 2006-2013
Monsanto	2000, 2002-2003, 2006-2010
National Oilwell Varco	2005-2013
Occidental Petroleum	2000-2001, 2004, 2006-2007, 2013
PPG Industries	2000-2001, 2006-2009, 2011-2013
Progressive	2000-2002, 2006-2008, 2011-2013

Table A.10: **Changes in Likelihood of Top Incomes, for Tier 3-5 Universities Losing Access to Prestigious Firms Between 2007 and 2009**

	Top Quintile		Top 10%		Top 5%		Top 1%	
1980*University Lost Access	-0.0177	-0.0010	-0.0191	-0.0037	-0.0103	-0.0035	-0.0041	-0.0045**
	(0.0156)	(0.0085)	(0.0154)	(0.0088)	(0.0122)	(0.0063)	(0.0049)	(0.0019)
1981*University Lost Access	-0.0127	0.0025	-0.0128	0.0044	-0.0142	-0.0006	-0.0026	-0.0018
	(0.0175)	(0.0080)	(0.0127)	(0.0072)	(0.0112)	(0.0050)	(0.0062)	(0.0024)
1982*University Lost Access	-0.0168	-0.0110	-0.0092	-0.0040	-0.0097	-0.0012	-0.0020	-0.0027
	(0.0153)	(0.0080)	(0.0133)	(0.0079)	(0.0096)	(0.0050)	(0.0050)	(0.0022)
1983*University Lost Access	-0.0045	-0.0066	-0.0029	-0.0015	-0.0050	-0.0022	-0.0016	-0.0003
	(0.0145)	(0.0070)	(0.0110)	(0.0062)	(0.0093)	(0.0049)	(0.0035)	(0.0020)
1985*University Lost Access	0.0050	-0.0021	0.0005	-0.0025	-0.0087	-0.0066	-0.0052	-0.0027
	(0.0127)	(0.0061)	(0.0082)	(0.0053)	(0.0071)	(0.0045)	(0.0032)	(0.0020)
1986*University Lost Access	0.0012	-0.0082	-0.0084	-0.0059	-0.0034	-0.0049	-0.0050	-0.0045*
	(0.0110)	(0.0078)	(0.0095)	(0.0061)	(0.0059)	(0.0041)	(0.0040)	(0.0025)
1987*University Lost Access	-0.0083	-0.0144*	-0.0115	-0.0156**	-0.0010	-0.0037	-0.0028	-0.0019
	(0.0130)	(0.0087)	(0.0113)	(0.0074)	(0.0076)	(0.0056)	(0.0065)	(0.0036)
1988*University Lost Access	-0.0059	-0.0098	-0.0153	-0.0140	0.0027	-0.0040	-0.0033	-0.0027
	(0.0156)	(0.0122)	(0.0142)	(0.0090)	(0.0089)	(0.0075)	(0.0075)	(0.0042)
1989*University Lost Access	-0.0005	-0.0053	-0.0088	-0.0083	-0.0012	-0.0038	-0.0034	-0.0028
	(0.0211)	(0.0139)	(0.0179)	(0.0109)	(0.0119)	(0.0089)	(0.0061)	(0.0034)
1990*University Lost Access	0.0001	-0.0102	-0.0087	-0.0135	0.0038	-0.0051	0.0011	0.0003
	(0.0216)	(0.0136)	(0.0184)	(0.0113)	(0.0117)	(0.0095)	(0.0038)	(0.0030)
1991*University Lost Access	-0.0292	-0.0089	-0.0369	-0.0174	-0.0105	-0.0074	0.0072	0.0004
	(0.0277)	(0.0175)	(0.0260)	(0.0148)	(0.0170)	(0.0098)	(0.0060)	(0.0033)
N	792	1,416	792	1,416	792	1,416	792	1,416
R-Squared	0.9626	0.9472	0.9536	0.9401	0.9403	0.9114	0.8378	0.7633
Mean $Y_{1984,LostAccess}$	0.478	0.461	0.294	0.274	0.162	0.146	0.0328	0.0291
Tier 3-5 Univ. Losing Access in Same Area as Tier 3-5 Univ. not Losing Access	11	20	11	20	11	20	11	20
Tier 3-5 Univ. Not Losing Access in Same Area as Tier 3-5 Univ. Losing Access	18	58	18	58	18	58	18	58
State-Tier-Cohort FE	N	Y	N	Y	N	Y	N	Y
CZ-Tier-Cohort FE	Y	N	Y	N	Y	N	Y	N

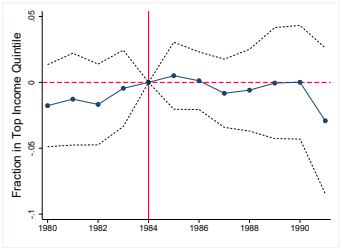
Notes: *** p-value $\leq$ .01, ** p-value $\leq$ .05, * p-value $\leq$ .1. This table shows the regression coefficients associated with Figures A.38 and A.39. See Figure A.38 , Figure A.39 and text for details of the regression specifications and included covariates.

Table A.11: **Differential Changes in Tier 3-5 University Characteristics, for Universities Losing Access to Prestigious Firms Between 2007 and 2009, CZ-Cohort Fixed Effects**

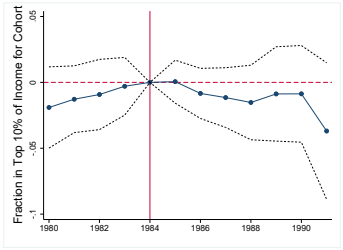
	Share with Parents in Income Quintile					Share with Parent Income in Top					
	1	2	3	4	5	10%	5%	1%	0.10%	Ln(Students)	Share Female
1980*University Lost Access	0.0084	-0.0009	-0.0036	0.0017	-0.0056	-0.0062	-0.0071	0.0023	0.0009	0.0223	-0.0052
	(0.0055)	(0.0069)	(0.0067)	(0.0086)	(0.0151)	(0.0123)	(0.0084)	(0.0034)	(0.0010)	(0.0587)	(0.0144)
1981*University Lost Access	-0.0032	-0.0050	0.0015	-0.0028	0.0095	0.0052	-0.0007	0.0053	0.0006	-0.0301	-0.0015
	(0.0040)	(0.0078)	(0.0091)	(0.0112)	(0.0131)	(0.0098)	(0.0084)	(0.0034)	(0.0010)	(0.0481)	(0.0130)
1982*University Lost Access	0.0002	-0.0079	-0.0020	0.0007	0.0090	0.0090	-0.0059	0.0005	-0.0008	-0.0265	-0.0054
	(0.0047)	(0.0062)	(0.0075)	(0.0064)	(0.0089)	(0.0087)	(0.0069)	(0.0022)	(0.0013)	(0.0343)	(0.0119)
1983*University Lost Access	0.0004	-0.0035	-0.0000	0.0007	0.0024	0.0017	0.0012	0.0034	0.0002	0.0063	-0.0002
	(0.0066)	(0.0066)	(0.0061)	(0.0055)	(0.0073)	(0.0063)	(0.0054)	(0.0025)	(0.0011)	(0.0329)	(0.0121)
1985*University Lost Access	-0.0045	0.0013	0.0107*	-0.0099	0.0024	0.0090	0.0016	0.0104***	0.0011	-0.0581***	-0.0046
	(0.0050)	(0.0065)	(0.0062)	(0.0078)	(0.0088)	(0.0083)	(0.0060)	(0.0038)	(0.0009)	(0.0209)	(0.0091)
1986*University Lost Access	0.0015	0.0013	0.0041	0.0026	-0.0095	-0.0015	-0.0028	0.0071**	0.0016	-0.1015***	0.0020
	(0.0057)	(0.0063)	(0.0061)	(0.0092)	(0.0096)	(0.0061)	(0.0050)	(0.0028)	(0.0010)	(0.0309)	(0.0123)
1987*University Lost Access	0.0039	-0.0041	0.0106**	-0.0029	-0.0074	-0.0075	-0.0087	0.0060**	-0.0002	-0.0836**	-0.0139
	(0.0055)	(0.0072)	(0.0051)	(0.0090)	(0.0112)	(0.0083)	(0.0058)	(0.0026)	(0.0014)	(0.0362)	(0.0110)
1988*University Lost Access	0.0019	0.0002	0.0158**	0.0014	-0.0192	-0.0068	-0.0135**	0.0044	0.0002	-0.0550	-0.0215*
	(0.0043)	(0.0079)	(0.0066)	(0.0089)	(0.0132)	(0.0103)	(0.0067)	(0.0034)	(0.0010)	(0.0462)	(0.0109)
1989*University Lost Access	-0.0104	-0.0022	0.0214***	0.0035	-0.0122	-0.0141	-0.0171*	0.0015	0.0004	-0.0731	-0.0084
	(0.0100)	(0.0073)	(0.0081)	(0.0080)	(0.0185)	(0.0131)	(0.0089)	(0.0038)	(0.0008)	(0.0459)	(0.0131)
1990*University Lost Access	-0.0057	-0.0031	0.0191***	0.0028	-0.0131	-0.0158	-0.0131	0.0028	0.0003	-0.1070**	-0.0173
	(0.0103)	(0.0083)	(0.0057)	(0.0074)	(0.0166)	(0.0136)	(0.0091)	(0.0035)	(0.0011)	(0.0486)	(0.0153)
1991*University Lost Access	-0.0046	-0.0018	0.0123	-0.0056	-0.0002	-0.0023	-0.0084	0.0044	0.0012	-0.1340**	-0.0034
	(0.0118)	(0.0084)	(0.0078)	(0.0080)	(0.0221)	(0.0170)	(0.0111)	(0.0035)	(0.0012)	(0.0576)	(0.0148)
N	792	792	792	792	792	792	792	792	792	792	792
R-Squared	0.9641	0.9510	0.8881	0.8839	0.9700	0.9683	0.9682	0.9298	0.7482	0.9964	0.9810
CZ-Cohort FE	Yes										
University FE	Yes										

Notes: *** p-value $\leq$ .01, ** p-value $\leq$ .05, * p-value $\leq$ .1. This table shows the results from estimating equation (5), but using the characteristics X as dependent variables. All columns include a balanced sample, CZ–birth cohort fixed effects, and university fixed effects. The last two columns additionally include interactions between birth cohort fixed effects and the following variables: share of students with parents in the second income quintile, third, fourth, and fifth, and share with parents in the top 10% of incomes (as well as these parental income variables uninteracted). See text for details.

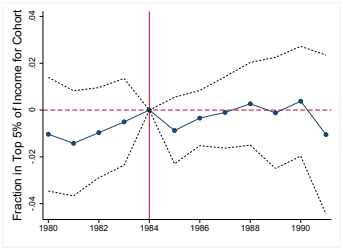
Figure A.38: **Likelihood of Top Earnings, for Tier 3-5 Universities Losing Access to Prestigious Firms Between 2007 and 2009, CZ-Cohort Fixed Effects**



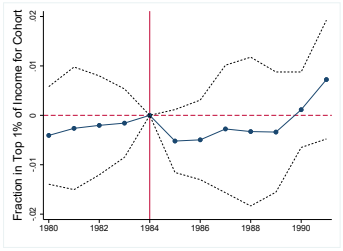
(a) Top Quintile Earnings



(b) Top 10% Earnings

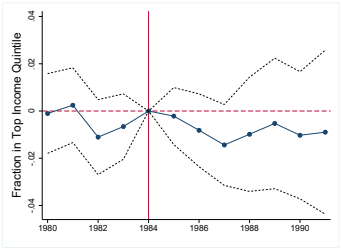


(c) Top 5% Earnings



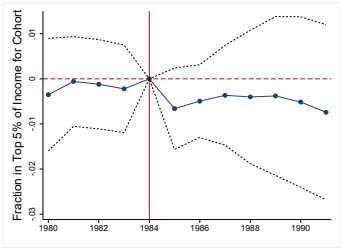
(d) Top 1% Earnings

Figure A.39: **Likelihood of Top Earnings, for Tier 3-5 Universities Losing Access to Prestigious Firms Between 2007 and 2009, State-Cohort Fixed Effects**

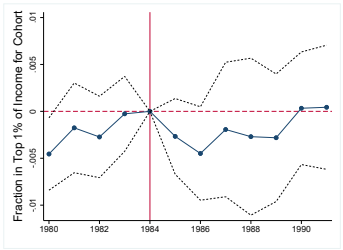


(a) Top Quintile Earnings

(b) Top 10% Earnings



(c) Top 5% Earnings



(d) Top 1% Earnings

Notes: Dashed lines show 95% confidence intervals. Plots show coefficients, from equation (5), on the interaction between birth cohort fixed effects and an indicator for the university losing access to at least one prestigious firm recruiting on campus between 2007 and 2009. Figure A.38 includes CZ-birth cohort fixed effects, while Figure A.39 includes state-birth cohort fixed effects. The sample includes only universities with data for each cohort. See text for details on all covariates included in the regression.

Table A.12: **Differential Changes in Tier 3-5 University Characteristics, for Universities Losing Access to Prestigious Firms Between 2007 and 2009, State-Cohort Fixed Effects**

	Share with Parents in Income Quintile					Share with Parent Income in Top					
	1	2	3	4	5	10%	5%	1%	0.10%	Ln(Students)	Share Female
1980*University Lost Access	-0.0003	-0.0067	-0.0040	0.0064	0.0046	-0.0042	-0.0077	-0.0004	-0.0004	-0.0452	0.0029
	(0.0040)	(0.0047)	(0.0052)	(0.0057)	(0.0107)	(0.0076)	(0.0058)	(0.0020)	(0.0006)	(0.0427)	(0.0078)
1981*University Lost Access	-0.0021	-0.0078	-0.0015	0.0010	0.0105	0.0059	-0.0016	0.0028	-0.0004	-0.0288	0.0029
	(0.0025)	(0.0050)	(0.0052)	(0.0063)	(0.0080)	(0.0063)	(0.0050)	(0.0018)	(0.0006)	(0.0313)	(0.0066)
1982*University Lost Access	-0.0003	-0.0083*	-0.0002	0.0025	0.0064	0.0014	-0.0030	0.0018	-0.0006	-0.0313	0.0063
	(0.0027)	(0.0042)	(0.0045)	(0.0050)	(0.0064)	(0.0057)	(0.0044)	(0.0012)	(0.0006)	(0.0253)	(0.0063)
1983*University Lost Access	-0.0021	-0.0052	0.0040	0.0013	0.0020	0.0016	-0.0029	0.0010	-0.0004	-0.0146	0.0060
	(0.0036)	(0.0038)	(0.0044)	(0.0044)	(0.0050)	(0.0042)	(0.0031)	(0.0015)	(0.0006)	(0.0216)	(0.0056)
1985*University Lost Access	-0.0022	0.0009	0.0048	-0.0032	-0.0002	-0.0007	-0.0033	0.0036*	0.0002	-0.0313*	0.0083
	(0.0030)	(0.0041)	(0.0042)	(0.0047)	(0.0049)	(0.0044)	(0.0036)	(0.0022)	(0.0005)	(0.0175)	(0.0060)
1986*University Lost Access	-0.0012	-0.0028	0.0048	0.0049	-0.0057	-0.0053	-0.0047	0.0030*	0.0002	-0.0329	0.0130**
	(0.0031)	(0.0048)	(0.0041)	(0.0055)	(0.0064)	(0.0053)	(0.0038)	(0.0017)	(0.0006)	(0.0239)	(0.0054)
1987*University Lost Access	-0.0007	-0.0005	0.0039	0.0008	-0.0034	-0.0054	-0.0086**	0.0010	-0.0005	-0.0084	0.0009
	(0.0030)	(0.0043)	(0.0045)	(0.0049)	(0.0068)	(0.0060)	(0.0040)	(0.0022)	(0.0006)	(0.0261)	(0.0055)
1988*University Lost Access	0.0005	-0.0040	0.0092**	0.0009	-0.0065	-0.0075	-0.0078*	0.0007	0.0000	0.0031	-0.0034
	(0.0034)	(0.0048)	(0.0043)	(0.0058)	(0.0085)	(0.0067)	(0.0043)	(0.0022)	(0.0006)	(0.0322)	(0.0073)
1989*University Lost Access	-0.0078	-0.0042	0.0128**	0.0036	-0.0044	-0.0083	-0.0114*	-0.0004	-0.0001	-0.0317	0.0066
	(0.0054)	(0.0047)	(0.0051)	(0.0071)	(0.0116)	(0.0095)	(0.0066)	(0.0026)	(0.0006)	(0.0343)	(0.0070)
1990*University Lost Access	-0.0050	-0.0040	0.0130**	0.0004	-0.0044	-0.0079	-0.0075	-0.0005	-0.0004	-0.0601	-0.0017
	(0.0056)	(0.0052)	(0.0055)	(0.0071)	(0.0120)	(0.0103)	(0.0060)	(0.0019)	(0.0005)	(0.0366)	(0.0084)
1991*University Lost Access	-0.0057	-0.0007	0.0123**	-0.0064	0.0006	-0.0036	-0.0082	0.0013	0.0004	-0.0955**	0.0027
	(0.0060)	(0.0052)	(0.0062)	(0.0068)	(0.0140)	(0.0106)	(0.0062)	(0.0024)	(0.0006)	(0.0423)	(0.0082)
N	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416
R-Squared	0.9516	0.9371	0.8764	0.8547	0.9599	0.9569	0.9567	0.9276	0.7503	0.9953	0.9793
State-Cohort FE	Yes										
University FE	Yes										

Notes: *** p-value $\leq$ .01, ** p-value $\leq$ .05, * p-value $\leq$ .1. This table shows the results from estimating equation (5), but using the characteristics X as dependent variables. All columns include a balanced sample, state-birth cohort fixed effects, and university fixed effects. The last two columns additionally include interactions between birth cohort fixed effects and the following variables: share of students with parents in the second income quintile, third, fourth, and fifth, and share with parents in the top 10% of incomes (as well as these parental income variables uninteracted). See text for details.